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ELECTRICAL REVIEW

Vol. CLI 4th JULY, 1952 No. 3893

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IN THIS ISSUE

Contractors' Views 1
Heavy Steel Rolling 3
Views on the News 13
Personal and Social 14
Correspondence 18
Cable Industry Inquiry 19
E.C.A. Conference Report 21
Presidential Address 22
Conference Papers 24
Iron and Steel Productivity 30
Decreased Sales in East Midlands 30
Furnace Developments 31
Commerce and Industry 32
Parliamentary News 37
In the Courts 39
Sealed Refrigeration Units 40
Electricity Supply 43
Engineering in Europe 45
Recent Introductions 47
London's Trams 48
Financial Section 49
New Patents 53
Contract Information 55

Classified Advertisements 121
Index to Advertisers 136

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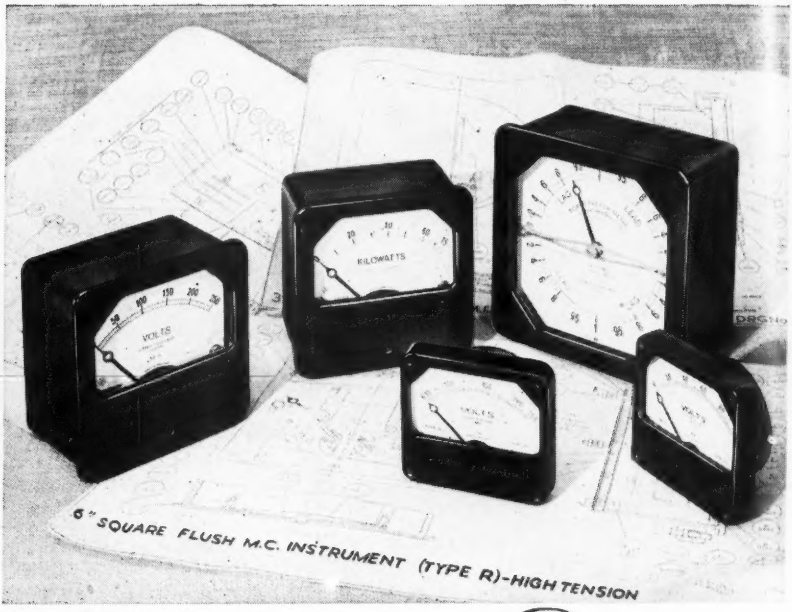

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ELECTRICAL REVIEW

4th JULY, 1952

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CLI • NO. 3893

Contractors' Views

IT may be said of electrical contractors' problems that the more they change the more they are the same thing. This was evident in the address given by the president of the Electrical Contractors' Association, Mr. Stanley Watkins, on Tuesday last, at the Association's conference at Eastbourne. Ever since it was formed just over fifty years ago the Association has had to contend with the competition of the electricity supply authorities. It is still a matter of the greatest concern and more so than in the past. As has been said repeatedly, the " private " contractor does not fear competition provided it is competition on level terms—not subsidized from profits on the sale of electricity. The British Electricity Authority, with Lord Citrine's active inspiration, has made great endeavours to live in harmony with the contractors and many of the Area Boards (who are really concerned) have accepted the B.E.A.'s guidance in this matter. Other Boards have not been quite so co-operative but that may have been because of the contractors' reluctance and suspicion. It is quite certain that the Boards will continue their installation activities and consequently the contractors must come to terms with them.

Mr. Watkins was right in deprecating the practice of public authorities placing their electrical work exclusively with Electricity Boards. Even if it is not legally wrong it is not in the best interests of ratepayers. This is not the Boards' fault, however; it seems to be a subject for consideration by the Minister of Housing and Local Government.

The perennial controversy of compulsory *versus* voluntary registration was inevitably dealt with in the address. A scheme for more or less voluntary registration to cover both Electricity Boards and private contractors has been drafted. It awaits the decision of the E.C.A. which has advocated compulsory registration for about half a century. Mr. Watkins referred, without actually naming it, to the National Register of Electrical Installation Contractors and its

somewhat qualified success. It has to be said, however, that the proposed National Inspection Council would have behind it some measure of compulsion (" moral suasion " is the usual term) and might be more successful. It would have to be to justify its cost—a point which Mr. Watkins touched upon. Another interesting activity referred to was the fostering of electrical retailing, in which non-members are involved. It will be interesting to see how this develops. We have always considered that retailing is a proper function of the electrical contractor. Essential after-sales service can be given only by people who possess the necessary qualifications.

MATERIAL PRICES

Buyers of materials for the electrical industry have had a difficult time for some years past and there are still no signs of any settled prices. The general shortage has been accentuated by the Korean war and the effect has been reflected in the substantial rise in prices since mid-1950. The dollar price for copper for instance has increased from 22 to 35 cents per lb; the British price was jumped up by £50 last month and a further rise is anticipated. The price of lead, which had not risen in the same proportion, was declining until recently when the trend was reversed. The rubber position remains uncertain; although the price is still higher than in June, 1950, growers state that it is unremunerative. Zinc is the only non-ferrous metal which, after rising, has returned to its " pre-Korea " price.

DOUBTFUL CONTENTION

It is persistently claimed in some quarters that the domestic user of electricity is obtaining cheap supplies at the expense of industry. In evidence presented to the Ridley Committee, the Institution of Incorporated Plant Engineers repeats this assertion and quotes five examples to prove it. And yet in its last published report (1950–51) the British Electricity Authority showed that the 21,703 million kWh sold to domestic, commercial and small power users brought in an average of 1·46d/kWh, while 23,001 million kWh taken under " large power " tariffs cost the consumers 0·930d/kWh. It was shown that the individual Electricity Boards' receipts from domestic, etc., consumers, varied from 1·13d/kWh (S.W. Scotland, where large power brought in 0·97d/kWh) to 1·68d (London). Receipts from large power ranged from 0·73d (South Wales) to 1·38d (London).

END OF AN EPOCH

Next week-end London will lose one of its characteristic sights. The trams, which in one form or another have plied along its streets for nearly a century, will thereafter be seen no more. Motorists will breathe a sigh of relief, as also will the younger travellers who have had to use the dingy vehicles which have latterly ground their way along tracks obviously destined for abandonment; for twenty years no new trams have been built to run on them. Nevertheless, to many of the older Londoners, the occasion will stir a feeling of regret, for in their heyday the London trams formed one of the largest systems in the world, which gave efficient and cheap service.

AVOIDING OVERLAPPING

We repeat our request to those who are arranging functions to acquaint us with the dates. We have a record of events and if we are kept informed we shall be able to let enquirers know whether proposed dates have been "pre-empted" or not and by this means help them to avoid overlapping. Please write to the *Electrical Review*, Room 231, Dorset House, Stamford Street, London, S.E.1 (Waterloo 3333, extension 202)

HEAVY STEEL ROLLING

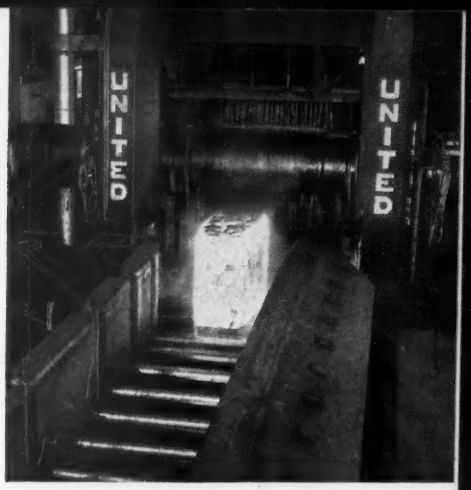
Slabbing Mill Operations at the New Port Talbot Works

TO continue our series on the electrical applications to production at various sections of the new Port Talbot works of the Steel Company of Wales, Ltd., the last of which, dealing with the Abbey melting shop, appeared in the *Electrical Review* of 22nd February, 1952, we now present the electrical story pertaining to the slabbing mill, also in the Abbey section of the works.

The ingots, each weighing up to 20 tons, produced in the melting shop, are brought, in their moulds, to the stripping bay of the slabbing mill on the ingot trains. This bay really constitutes one end of the rolling mill bay proper, with the stripping equipment, the soaking pits and the mills. The moulds are lifted off the ingots by one of two stripper cranes each of which has a pair of hydraulically operated tongs for gripping the mould and a screw operated ram for ejecting the ingot. The 40 ton lifting and 200 ton stripping motions of these cranes are served by 200 h.p. and 150 h.p. motors, respectively, while for long travel there are two 75 h.p. motors, for cross travel a 50 h.p. motor, and for the pump for the hydraulic tongs a 10 h.p. motor.

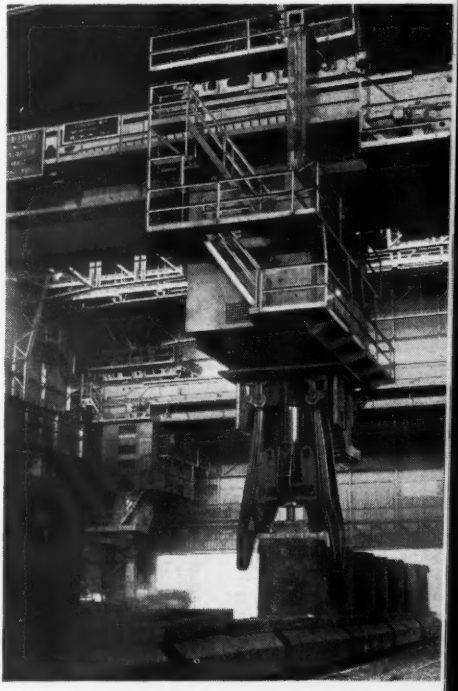
On their rail cars, the stripped ingots are hauled along the track to required points by the soaking pits to which they are carried by two overhead 20 ton charger cranes, each having a hoisting motor of 150 h.p., two 50 h.p. long travel motors, a 50 h.p. cross travel motor, a tong gripping motor of 35 h.p., and a tong rotating motor of 15 h.p. All the stripper and charger cranes are of Adamson-Alliance make, and all their motors are G.E.C. mill-type machines.

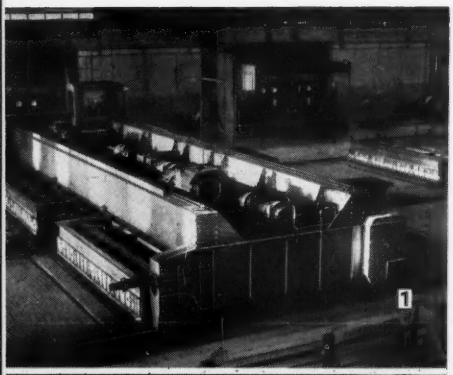
The crane motors are controlled by the Igranic " CondITL " system, the panels



The ingot is passed to the slabbing mill proper by the entry section of the roller tables

The moulds are lifted off their ingots by stripper cranes with 40 ton lifting and 200 ton stripping motions, the latter being a screw operated ram for ingot ejection





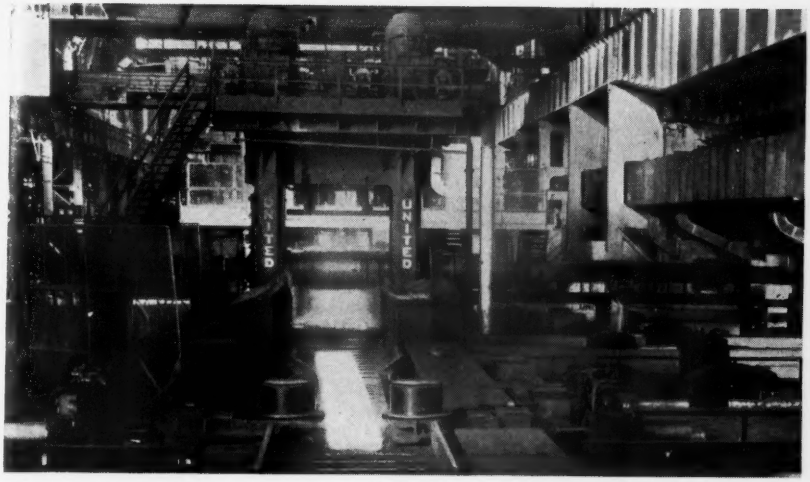
(1) Each soaking pit has a 32 ton cover which is raised, traversed and lowered by one of the 40 ton cover lifting cranes (left) running on a track surmounting the pit structure; glazed control room in rear. (2) Ingots are handled at the soaking pits by 20 ton charger cranes. (3) The hot ingot is delivered to the mill by a buggy with motor operated traverse, tilt and roll-off motions

for which are in a separate control room on each crane. Each crane has an "Air-Rectifier" which recirculates continuously a cooled purified air stream through the driver's cab, maintaining the temperature at about 70 deg F; otherwise it might be as much as 170 deg F with the cab over an open pit.

Twenty of the twenty-four Wellman Smith Owen bottom fired recuperator Amsler-Morton soaking pits are in service; they are automatically fired on the regenerative principle, like the melting shop furnaces, with a mixture of blast furnace and coke oven gases. For each pair of soaking pits there is an almost entirely glazed control room in which is a comprehensive Reavell-Askania instrumentation and control scheme. This records and controls gas and air flows and pressures, pit pressures and temperatures, and indicates pre-set soaking heats. Each soaking pit has a flat cover weighing 32 tons which is raised, traversed and lowered by one of two electrically operated 40 ton W.S.O. cranes which run on a track at pit top level. The hoist and traverse motions on each crane are served by 25 h.p. and 15 h.p. G.E.C. mill motors, respectively.

Heated ingots removed from the pits by the charger cranes are placed in a buggy, on rails alongside the pits. The buggy has electrically operated traverse (two of 100 h.p.), tilt (75 h.p.) and roll off (35 h.p.) motions, and photo-electric cells provide for automatic slowing-down and stopping operations at each end of the track and for indication of the buggy position along the track. On tilting, the buggy delivers the ingot on to the first section of the roller table which runs throughout the whole length of the mill, conveying the ingot and its subsequent products to and from the various sections of the mill. According to their lengths the roller table sections are driven by 35 h.p. to 150 h.p. G.E.C. mill motors.

The first roller table section delivers the ingot to an automatic turning and weighing stand, with 50 h.p. and 25 h.p. drives, for the lifting and turning motions, respectively, and when properly aligned the ingot is passed on to the mill proper. The slabbing mill is a United Engineering two-high reversing equipment which is capable of rolling 20 ton ingots into slabs up to 45in wide and has an output of 300 ton/hr. Each of the rolls is directly driven by a

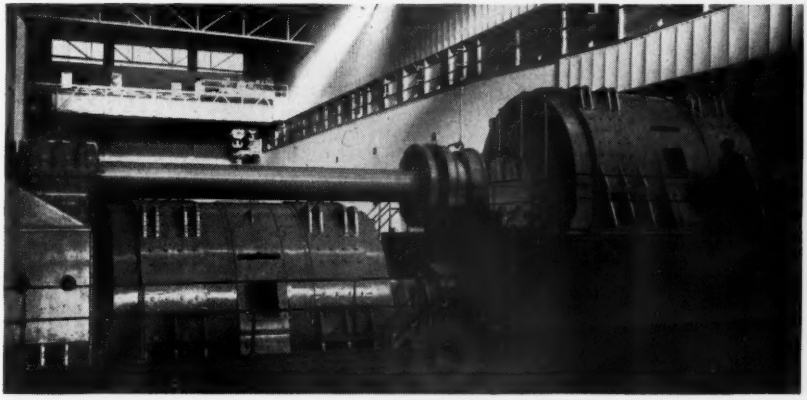


The two-high reversing slabbing mill capable of rolling 20 ton ingots at the rate of 300 tons/hr

double armature English Electric 4,600 h.p. motor which will develop a peak torque of 490 metre-tons and a combined peak h.p. of 27,000. Roll speeds up to 40 r.p.m. are afforded by voltage control, while speeds from 40 to 80 r.p.m. are obtained by field weakening of the mill motors.

These main mill d.c. motors are supplied with energy by an English Electric Ilgner motor-generator set with four 1,850 kW 550 V generators and a 6,500 h.p. slip ring driving motor, all in tandem. The Ilgner flywheel has a stored energy of 200,000 h.p.-sec, and as the load peaks build up an automatically controlled slip regulator slows down the driving motor, thereby allowing the flywheel to give up some of its stored energy. After each peak the motor is again accelerated to its original speed, the driving motor and supply system having been relieved considerably of the load peak. Under rolling conditions the speed range of

Each roll of the slab mill is driven by a double armature 4,600 h.p. motor (peak torque 490 metre-tons)



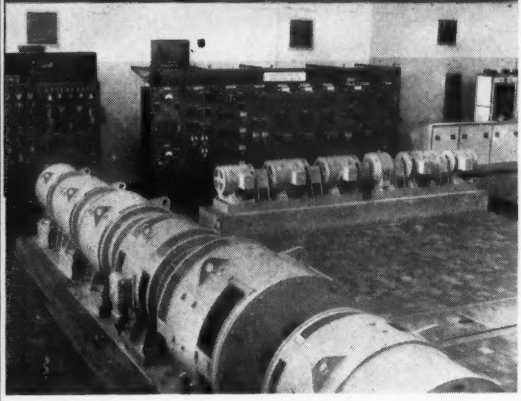
the Ilgner m.g. set is from 495 to 395 r.p.m. In common with all the larger drives in the plant the Ilgner set driving motor is supplied direct from the works 11 kV system through Reyrolle 150 MVA switchgear. Additional switchgear is provided for dynamic braking of the Ilgner set which can be brought to rest in about three minutes by this method. Each mill main motor armature and its associated generator on the Ilgner set are connected in series.

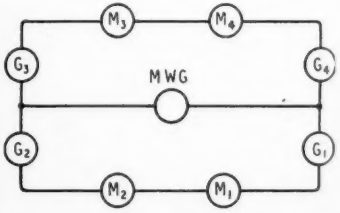
To ensure simultaneous reversal of both main mill motors, and to prevent the possibility of one mill motor slowing down, while the speed of the other increases, with full voltage across its two armatures when the mill is running light, a "mid-wire" generator is connected across the circuit so as to "divide" it symmetrically in regard to the number and arrangement of the main motor armatures and the m.g. set generators. By this means also the speeds of the two motors can be varied by about ± 5 per cent to compensate for changes in top and bottom roll diameters and differential torques on the two motors can be obtained by varying the excitation of the mid-wire generator.

The mill motor fields are supplied from a constant voltage exciter, with a bucking exciter in series, so that speed over the weakened field range is governed by controlling the output of the bucking exciter from the main controller via its own exciter.

Some of the more important protection features of this somewhat exacting driving and control scheme are: automatic voltage control of the variable-voltage m.g. set generators at any position of the controller; automatic reduction of the generator voltage at loads exceeding 2·5 times full load; and automatic compounding of the main mill motors when their currents exceed 1·5 times full load current. By the use of a quick response control scheme the reversal time of the mill from base speed (40 r.p.m.) to base speed is of the order of 2 sec.

The Ilgner set is started and stopped from a control desk in the motor room from which also all auxiliaries such as oil pumps,





To ensure simultaneous reversal of main mill motors their armatures and associated Ilgner set generators are connected in series; a "mid-wire" generator "divides" the circuit symmetrically

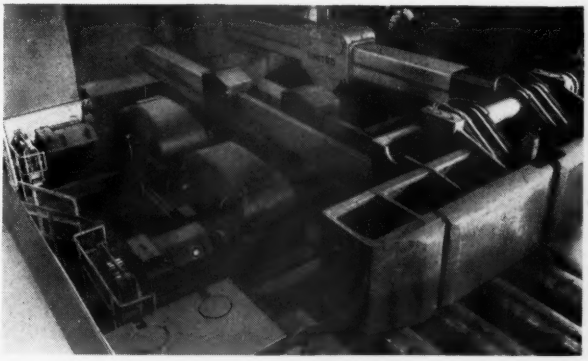
Top left: The main mill d.c. motors are supplied by an Ilgner m.g. set with four 1,850 kW generators and a 6,500 h.p. s.r. driving motor, all in tandem

Left: Each main mill motor field is supplied by a constant voltage exciter, with a bucking exciter in series

cooling and air cleaning plant are controlled. An extensive alarm system indicates excessive bearing temperatures in the Ilgner set and mill motors, failure of oil pressure and flow, overload and fault conditions.

The maximum opening between the rolls of the mill is 68in, and the mill screws are driven by two 200 h.p. mill-type motors which lift the roll at 34ft/min. The mill rolls are 115in long. They are provided with three sets of edging "holes," run in roller bearings and are balanced by a deadweight system. Right-hand and left-hand manipulators are provided on the entry and delivery sides of the mill to place the ingot at the required section of the rolls and there is a device on the entry side for turning the ingot over for flat or edge rolling. Each manipulator is driven by two 150 h.p. motors, as are also the working roller table sections on each side of the mill stand. Breast rollers are separately driven and are synchronized and controlled with the main drive. The English Electric Co., Ltd., was responsible for the entire main drive and control of the mill.

The whole operation of the main mill is governed from an air-conditioned pulpit which straddles the roller tables on the ingoing side of the mill stand. The mill driver controls the main mill motors by a foot-operated control unit and manipulates the roller table controllers with his left hand, and the screwdown controller with his right hand. A large Selsyn operated dial indicates the opening between the rolls, and an instrument panel carries instruments for the main mill motor speed and load indications, overload alarms and the controls for roll diameter compensation and differential torque. When rolling is completed the slab is conveyed to a vertical edging mill which is driven by an 800 h.p., 375 r.p.m., 3·3 kV Electric Construction Co. synchronous motor.

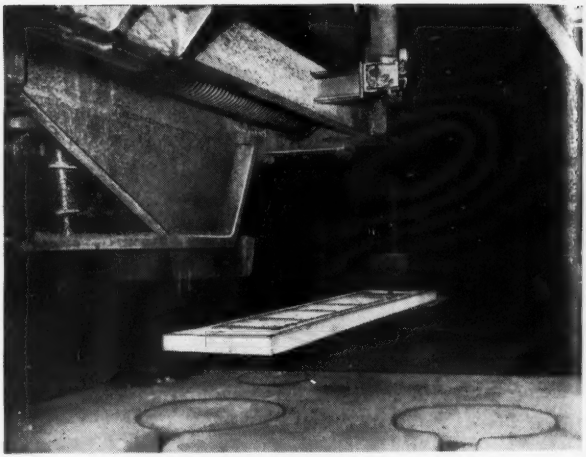


Above left: The entire operation of the main mill is governed from a pulpit which straddles the roller tables on the ingoing side of the mill stand

Above right: The Ilgner set is started and stopped from a control desk in the motor room from which other auxiliaries are also controlled

Right- and left-hand 150 h.p. motor driven manipulators place the ingots on the rolls

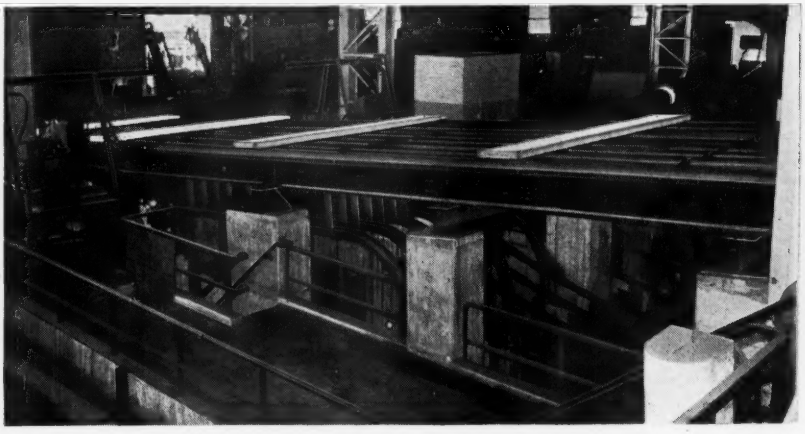
The rolled ingot, now slab, is conveyed from the edging mill to the shear by which it is cut into slabs of required lengths at a maximum operating speed of nine cuts per minute, the slabs being up to 9in thick and up to 45in wide. The shear is driven by two 500 h.p. d.c. motors through high ratio gearing. On the delivery side of the shear is a retractable gauge to enable the slabs to be cut to the exact lengths required. Ends cropped off the slabs fall down a chute into a submerged skip which is conveyed up an inclined track, at right angles to the mill flow line, by a 100 h.p. d.c. motor driven hoist. At the upper end of the incline, outside the building, the crop ends are loaded into wagons by crane and magnet handling for return to the melting shop. The 5 ton crop handling crane has 75 h.p., 25 h.p. and 75 h.p. motor driven hoist, cross travel and long travel motions. There is also a 10 ton crane for the disposal of mill scale.

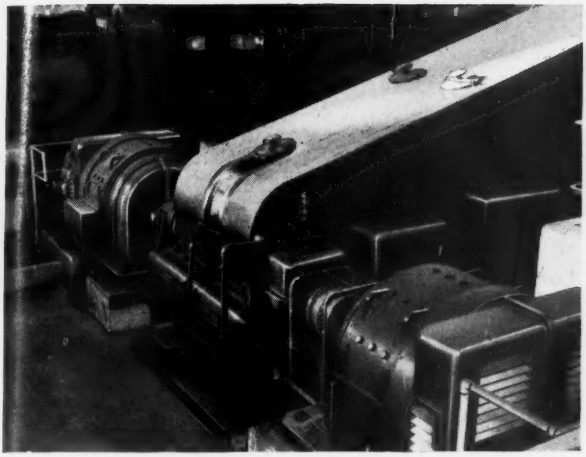


The shear cuts the slab into required lengths at a maximum operating speed of nine cuts a minute

The sheared slabs are weighed and pushed on to a slightly inclined chain type transfer bed which is driven by a 150 h.p. d.c. motor; on this the slabs are cooled and stamped for identification. From the transfer bed the slabs are pushed on to a piler platform. One slab is moved at a time, each operation following a lowering

The 150 h.p. motor driven chain type transfer bed passes the sheared slabs on to the piler platform and, in turn, to the transfer car and the slab stock yard



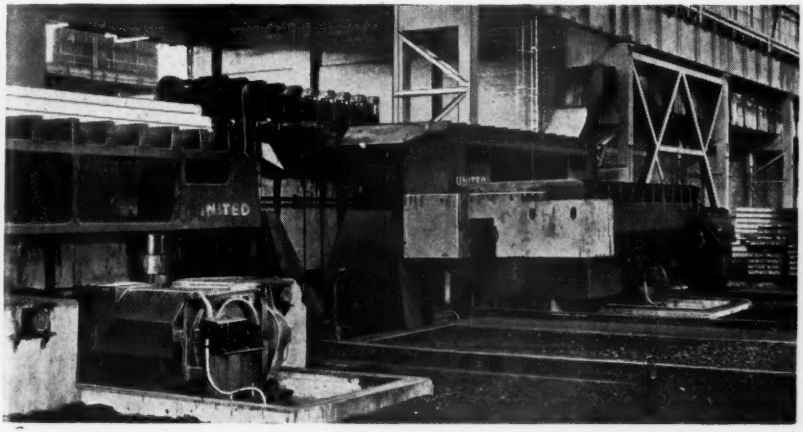


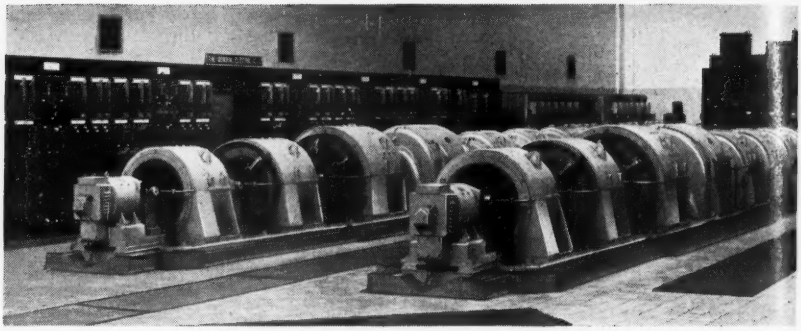
Two 500 h.p. d.c. motors drive the shear through high ratio gearing ; sideguide drives in rear

of the piler platform by the thickness of a slab. In this way a pile of six or seven slabs is built up on the platform from which the whole pile is then pushed on to a transfer car which conveys them to the slab stock yard where they are examined for scale occlusions; cracks are located by supersonic methods, dressing is effected by oxygen torches and the slabs are sorted into batches in readiness for continuous hot strip rolling, the subject of our next article. The motions relating to this last series of operations are powered as follows: slab pusher, 35 h.p.; piler, 150 h.p.; pile pusher, 100 h.p.; transfer car propulsion, 50 h.p.

The motors serving the ingot buggy, the mill screwdowns, the manipulators, the mill entry and delivery working tables, and the slab shear are supplied by two nine-machine m.g. sets, each driven by a 2,000 h.p., 3·3 kV, 1,000 r.p.m. synchronous motor. The General Electric Co., Ltd., was responsible for the whole of this auxiliary driving, supply and control scheme which includes Ward-Leonard systems having quick response (cascade) exciters on account of the frequent stopping, starting, reversing and rapid

From the transfer tables (right, rear) the slabs are pushed on to a piler platform (right, central) from which a pile of slabs is pushed on to a transfer car (right, lower level) ; a second piler is shown on left without its associated transfer car





The motors serving the ingot buggy, the mill screwdowns, the manipulators, the entry and delivery roller tables and the slab shear are supplied by two nine-machine m.g. sets

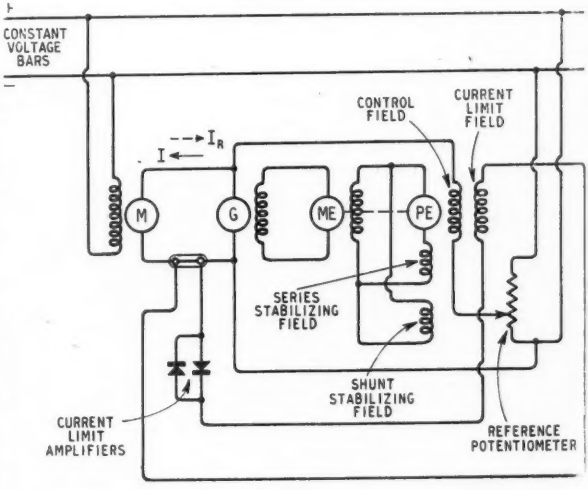
acceleration and deceleration to which the motors are subjected.

The cascade exciter control system is illustrated by a diagram. It shows the arrangement for the slab shear motor, from which the driving motors of the cascade exciter set and of the main generators have been omitted. The cascade exciter set comprises the pilot exciter (PE) which is mechanically coupled to the main exciter (ME). On starting up the plant a voltage is applied across the control field of the pilot exciter, its value being determined by the master controller (not shown) which operates the reference potentiometer. This machine immediately begins to generate and excite the main exciter (ME) which, in turn, excites the generator (G), so that a heavy current (I) flows through the slab shear driving motor (M) which thus accelerates rapidly.

At the same time the voltage of the generator (G) opposes that across the reference potentiometer and thus regulates the strength of the control field of the pilot exciter until a state of balance is reached, when the machine (G) generates the necessary voltage to run the motor (M) at the desired speed. In order to prevent an excessive current flowing through the motor at any time, current limiting rectifiers are provided.

If the current exceeds a predetermined safe value, these rectifiers permit current to flow through the current limit field of the pilot exciter (PE). This field opposes the control field and thus reduces the excitation of the pilot exciter and consequently

Simplified diagrammatic arrangement of cascade exciter control for the slab shear motor



of the main exciter and the main generator, thereby limiting the generated voltage to that required for a safe current to flow through the motor (M). Series and shunt stabilizing fields are provided on the pilot exciter to prevent hunting.

When the master controller is moved to the "off" position, the control field voltage, which is derived from the reference potentiometer, is zero, so that this field is excited solely from the main generator, and excitation of the pilot exciter is reversed. This, in turn, reverses the excitation of the main exciter and the generator the voltage of which is quickly reduced.

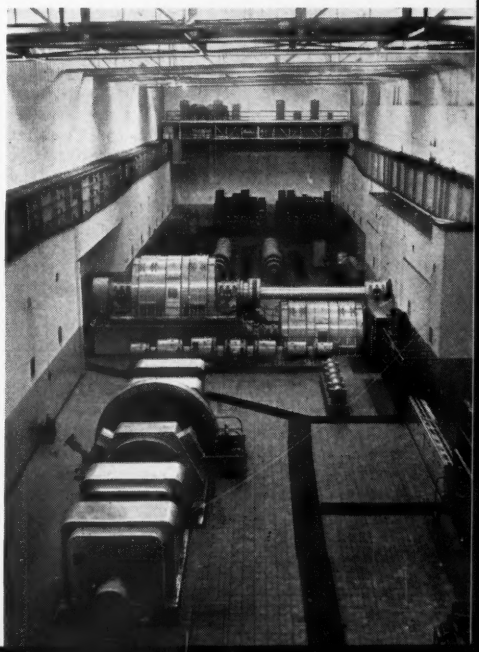
In consequence the motor (M) starts to regenerate and a heavy current (Ir) flows from the motor to the generator. If this exceeds a safe value the rectifiers again permit a current to flow through the current limit field of the pilot exciter in such a direction that this field opposes the control field until the correct degree of excitation is reached for the cascade exciter set and the main generator. Thus the motor is brought quickly to rest under controlled regenerative braking. It will be seen from the foregoing that the motor (M) is accelerated and retarded in the shortest possible time compatible with the safety of the electrical machines, and that the control is entirely automatic. Actually the time taken to run up the shear motor to full speed or to bring it to rest is about two seconds.

A similar control scheme is used on the ingot buggy. The remaining Ward-Leonard controlled drives are supplied by generators having three-field excitation with the well-known shovel characteristic. All the other auxiliary drives are controlled by the Igranic "ITL" system, the control panels for which are generally mounted back to back, with the resistances surmounting the panels. Type M magnetic brakes are used throughout. All the a.c. auxiliary drives employ s.c. motors which are direct-on started and are controlled by Allen West equipment.

For maintenance work and general services the mill is served by one 40 ton and three 85 ton Arrol cranes. The 40 ton crane has 100 h.p., 10 h.p. and 35 h.p. motor driven hoist, cross travel and long travel motions, respectively, while corresponding motors for each of the 85 ton cranes are 100 h.p., 25 h.p. and 50 h.p. In addition there is a 75 h.p. motor driven auxiliary hoist on each of the larger mill cranes. Throughout the plant Vaughan repair hoists for servicing the main cranes are mounted in the roof structures.

Oil lubrication of the mill plant is provided for by a central system having four gear type pumps (two stand-by) each driven by a 15 h.p. a.c. motor. Seven central "Farvalube" motor driven plants by Denco Engineering Services, Ltd., each working on automatic time control, together with numerous manually operated plants, provide grease for the mill machinery. The Ilgner set and the main mill motors have an extensive lubrication plant of their own in the motor room basement.

The main mill driving motors, their Ilgner m.g. supply set and their control gear, the Ward-Leonard supply sets for the auxiliaries and their control gear, as well as low voltage local distribution switchgear, are all housed in a separate air conditioned and pressurized motor room which is 360ft long and 65ft wide, and is serviced by its own Arrol overhead travelling crane which has motions powered as follows: main hoist (60 tons), 35 h.p.; auxiliary hoist (15 tons), 50 h.p.; long travel, 25 h.p.; and cross travel, 15 h.p.



Air conditioned control room housing the main mill motors, Ilgner m.g. set, Ward-Leonard supply sets, and exciter sets, together with their control equipment

The apparent discrepancy between the capacities of the main and auxiliary hoist motors is due to the very high ratio of the power transmission gearing in the main hoist drive to permit very low hoisting and lowering speeds for the careful placing of heavy machine parts.

The motor room ventilating plant is situated in a chamber above the local substation and comprises two 38,000 c.f.m. recirculating fans, two 12,000 c.f.m. plenum fans, one 42,000 c.f.m. basement make-up fan and three 21,600 c.f.m. electrostatic precipitators. The ventilating system serves to keep the air about all the electrical equipment clean, and to maintain a reasonable ambient temperature when as much as about 400 kW of heat energy may be dissipated by the machinery. For cooling the motor room there are two separate plants, each dealing with about half the room. These plants are of the recirculating type, and the cooled air is discharged into the motor room through evenly spaced grilles running along the whole length of the east wall. The cooled air absorbs heat as it passes across the motor room, to be extracted through grilles along the opposite and west wall. The air then passes back to the air cooler for the cycle to be repeated.

Special attention was given to the construction of the motor room building to make it reasonably airtight for pressurizing. The pressure is created by the two plenum fans which deliver clean air through ducts similar to those which form part of the recirculating system. A steam heated battery is incorporated in each plenum plant. All the air of the plenum system and for the basement make-up is cleaned by a Sturtevant electrostatic precipitation filter plant. Each of the three units of this plant can be isolated for cleaning. Other cooling plants for the Ilgner set, the main mill motors, the m.g. sets and the vertical edging mill motor are all of the recirculating type.

On all the d.c. machines in the motor room the commutators are separated from the main cooling system, although about 10 per cent of the cooling air is bled across the commutators. In the case of the Ilgner set generators and the main mill motors this air is extracted through ducts and discharged outside the motor room to ensure that carbon and copper particles do not find their way into the windings. Compensating air for this loss from each main system is cleaned by the filters already referred to, blown into the basement by the make-up fan, and again filtered by separate electrostatic precipitators before entering the system. Air is also drawn from the basement, which is sealed off from the motor room, and ducted to a number of the auxiliary driving motors grouped round the mill stand.

Each motor room and machine cooling plant has its own Heenan & Froude air cooler, the heat being transferred to water pumped around a self-contained recirculating system. The water, in turn, is cooled in two H. & F. water coolers situated on the roof of the main ventilating chamber. Make-up water is supplied from the mill clean water system.

We are indebted to the Steel Company of Wales, Ltd., for permission to view the mill plant and to publish this article, and to the executive officers of the Electrical and Production Departments for their co-operation in obtaining the information and illustrations.

Progress in the South West

MR. S. F. Steward, C.B.E., chairman of the South Western Electricity Board, announced last week that for the first time well over 1,100 farms in the South West had received a new supply of electricity in one year. More than 8,100 other rural premises were also provided with electricity during 1951–52. Mr. Steward, together with a number of leading agriculturists in Cornwall, was visiting the 1,000th farm in the South West to receive an electricity supply during the year—"Hendra," near Liskeard—at the invitation of Mr. and Mrs. Arthur Ford.

Mr. Steward said that new farm connections in 1951–52 totalled 1,174, compared with 911 in the previous year, bringing the total number of farms in the Area using electricity to 10,270—an increase of 3,940 in the four years of the Board's operations. Only electricity could provide the relatively cheap source of power, the mobility, ease of control and cleanliness which were so necessary to the farmer if this country's agricultural output was to be raised appreciably. In the South West well over 50,000 premises, including 18,000 farms, were awaiting an electricity supply, and the financial problem was accentuated by the widely-scattered population centres. The Board's line rental scheme enabled groups of new consumers to share the costs fairly and so provide collectively the minimum return necessary for the extension of supplies.

VIEWS on the NEWS

By REFLECTOR

IN common with other victims I am doubtful whether the recent increase in telephone charges is justified now. The Postmaster General told the House of Lords last week that increases in Post Office charges (including telephone charges) amounted to £9½ million. In the same speech he announced the restoration of the practice of making other Government Departments pay for their use of Post Office services which was costing £24 million a year, including £13 million for telephone and telegraph services. Earlier the Post Office had smugly pointed out that its telephone rentals were still only 50 per cent above the pre-war level while wages and the cost of materials had risen by over 100 per cent. Nothing was said about the "running" charges which seem to me to have increased by much more than 50 per cent.

* * *

Roof trees are out of date but a house at Walcote, near Lutterworth (Leics.) has nearly had one. The *Leicester Mercury* reports that the Lutterworth Rural Council decided to build a row of four houses by a row of poles belonging to the East Midlands Electricity Board. One of the poles was right in the middle of the site of one of the houses and the Board decided to move it a few yards. Apparently the Council was quicker than the Board, for a picture accompanying the report shows the house (at the end of May) about half up with the pole still in the centre. Probably it has been removed by this time. I would like to have seen how it was done.

* * *

I had not come across "Phonevision" until I read an article on American television by Roger Manvell in the *New Statesman* recently. The system, run by an American company, consists in transmitting a programme which gives a blurred image on the receiver's screen. The viewer can ask his telephone exchange for the programme and the picture is automatically clarified. The fee is charged on the telephone account, the telephone company passing over a share of it to the television station and the producer. How this is all done was not explained but the idea was recommended as a more satisfactory alternative to our licence system or reliance upon the whims of commercial sponsors.

* * *

It was suggested at a meeting of the Pontypool Housing Committee that housewives preferred electric cookers to gas ones. Thereupon, according to the local press, "four women councillors sitting in a row protested vigorously." They were supported by the architect who contended that 95 per cent of tenants preferred to cook by gas. The South Wales Electricity Board is apparently less convinced of the gas predilections of the tenants for the architect said he understood that the Board would lay underground mains at an extra cost of £400, or £18 per house, if the Council would provide points for a cooker and immersion heater, with a boss in the hot water tank to allow a heater to be fitted if desired. This was estimated to cost £6 5s 6d per house, but the Committee, by a majority of one vote, declined to provide these facilities. It is still pressing for the underground mains, however.

* * *

"Blue print" ranks with "target" among the most-abused words in common use. I have read in the June journal of the Amalgamated Engineering Union "A Song of Engineers," a set of verses of not very outstanding literary merit, which concludes:—

> "The men who can work to a thou' can draw
> The blueprints of a new world."

Even such accurate craftsmen would find it difficult to draw a blueprint for a much smaller job.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE new president of the Electrical Contractors' Association, **Mr. W. T. Trace,** is managing director of W. H. Trace & Son, Ltd., Birkenhead. He was born in 1905 and educated at the Birkenhead Institute Secondary School. He received his training with W. H. Trace & Son. Joining the E.C.A. in 1931, he served as hon. secretary of the Liverpool Branch for seven years and was chairman of the Branch in 1946-48. Mr. Trace has served on the Northern and North-Western Counties Sectional Boards of the Association since 1933 and was hon. secretary for six years. He was elected to the E.C.A. Council in 1942 and became a vice-president in 1950.

Mr. W. T. Trace

Mr. L. C. Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., has been re-appointed a member of the Council of Industrial Design.

Mr. E. C. Cherry, of the Imperial College of Science, has had the degree of D.Sc.(Engineering) conferred upon him by London University.

Mr. Richards W. Cotton, of the Philco Corporation, Philadelphia, has been appointed director of the Electronics Production Board of the United States Defense Production Administration. Mr. Cotton is a director of Philco (Overseas), Ltd.; he was formerly managing director of British Philco and, before joining Philco, was chairman and managing director of British Rola, Ltd.

Mr. V. L. F. Davis, A.M.I.E.E., deputy station superintendent at the Stoke generating station of the British Electricity Authority since 1948, retired on 30th June. Mr. Davis, who was educated at the North Devon School, Barnstaple, was an articled pupil with the Barnstaple Corporation and afterwards served with the Newcastle-on-Tyne Electricity Supply Co. In 1914 he joined the staff of the Stoke-on-Trent Corporation and was transferred to the North West Midlands Joint Electricity Authority on its inception in 1930 and in 1948 was appointed to the position from which he now retires.

Mr. Alec Corbett, managing director of Newey & Eyre, Ltd., has been returned unopposed to the Warwickshire County Council.

Following a meeting of the National Joint Industrial Council for the Electrical Cable Making Industry at the Royal Station Hotel, York, on 11th June, the Cable Makers' Association gave a complimentary luncheon to **Mr. R. G. Evans** on his retirement from the chairmanship of the Council. Mr. Evans, an official of the National Union of General and Municipal Workers, has been chairman of the Council for the last seven years, and since 1936 a member representing the trades unions. Sir John Dalton, director of the C.M.A. and vice-chairman of the Council, presided at the luncheon and after paying a tribute to the retiring chairman made a presentation to him on behalf of his colleagues on the Council. Expressions of appreciation were also made on behalf of the members of the Council: the Cable Makers' Association, the Independent Cable Makers' Association, the Covered Conductors Association and the trades unions.

Mr. R. P. Watson, B.A., B.A.I., M.I.E.E., deputy city electrical engineer and general manager, Belfast Corporation Electricity Department, has been appointed acting city electrical engineer for a period of twelve months in succession to Mr. W. J. Girvan who is retiring in September. The appointment has been made by the Electricity Committee subject to confirmation by the City Council. Mr. Watson was educated at Portora Royal School, Enniskillen, Co. Fermanagh, and Trinity College, Dublin. In 1932 he was appointed assistant mains engineer at Belfast, becoming mains engineer in 1936, sales engineer in 1939 and deputy city electrical engineer last year. In 1950-51 he served as chairman of the Northern Ireland Centre of the Institution of Electrical Engineers.

Mr. R. P. Watson

Johnson, Matthey & Co., Ltd., announce the appointment of **Mr. E. G. Pickering** as a joint managing director of the company as from 1st July.

Mr. A. L. Green, Companion I.E.E., will shortly complete fifty years' service as assistant secretary of the North Western Centre of the Institution of Electrical Engineers.

Mr. O. W. J. Farmer has been appointed manager of "Mazda" lamp and lighting advertising for the British Thomson-Houston Co., Ltd., in succession to Mr. H. E. Goody, who, as reported in our last week's issue, is retiring at the end of July. Mr. Farmer, who is forty, joined the staff of the "Mazda" Advertising Department in December, 1945, after war service with the Royal Air Force. He was appointed deputy manager of the department in November, 1948.

Mr. O. W. J. Farmer

Mr. H. W. Walker has been appointed power station superintendent at Kendal, where he has held the position of operating engineer since March, 1949. Mr. Walker has been associated with diesel plant throughout his career and from 1914 to 1916 was shift charge engineer at the G.E.C. power station, Funchal, Madeira. In 1920 he held a similar position with the Kendal Corporation before becoming operating engineer.

Major-General J. L. P. Haines, C.B., C.B.E., who has been appointed managing director of Aron Electricity Meter, Ltd., has had a distinguished military career, during which he held many responsible appointments. In addition he has occupied important technical and administrative posts with the War Office and the Ministry of Supply. In 1927 he entered the technical sphere and in the years before the last war held armament inspection and design appointments in Woolwich Arsenal. During the war he held various technical and administrative posts in the United States, Canada and the United Kingdom, culminating in his appointment as president of the Ordnance Board, Ministry of Supply, which appointment he vacated in February on his retirement from the Army.

Maj.-Gen. J. L. P. Haines

Mr. T. A. Higgins, Associate M.C.T., A.M.I.E.E., has been appointed manager of the electrical department of the Expanded Metal Company's West Hartlepool works, following the resignation of Mr. A. J. Franklin. Mr. Higgins, who received his technical education at the Manchester College of Technology, served his apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., and was for some years attached to the company's industrial control gear department. On leaving Metropolitan-Vickers in 1937 he spent some time with the General Electric Co., Ltd., and Wilfred Frances & Co. on the design of motor control gear, later joining Ferguson, Pailin, Ltd., with whom he was associated for a number of years in the sales and engineering departments on e.h.v. and l.v. switchgear. He joined the electrical department of the Expanded Metal Co., Ltd., in 1948 and was appointed assistant manager in 1949. Mr. Franklin's services will still be available to the company in an advisory capacity.

Mr. T. A. Higgins

Mr. S. W. Hutton, sales manager of Progress Cables & Accessories Co., Ltd., has been appointed to the board. He has been associated with the company since its formation in 1932 and now becomes sales director.

Mr. A. E. H. Boaz, at present deputy depot manager at Grimsby, has been appointed manager of the Falmouth Depot of the Marconi International Marine Communication Co., Ltd., in succession to the late Mr. C. J. A. Gill, who died suddenly last month.

A letter of commendation has been sent by Mr. S. F. Steward, chairman of the South Western Electricity Board, to **Mr. E. T. Breckon,** who was in charge of the Board's Whitchurch substation on 13th June when there was an explosion and fire which scattered flaming oil across the building. Mr. Steward refers to the resource and devotion displayed by Mr. Breckon and his colleagues which enabled the supply to be restored much earlier than would otherwise have been possible.

Mr. J. Williams, A.M.I.E.E., technical engineer, London Division, British Electricity Authority, is retiring at the end of the current month and his successor will be **Mr. E. B. Powell,** M.I.C.E., M.I.Mech.E., M.I.E.E., senior assistant engineer (development). Mr. Williams received his education at the University College of Wales, Aberystwyth, and Liverpool University, and his technical

training at the British Westinghouse works, Trafford Park. He was appointed testing engineer with Siemens Bros. & Co., Ltd., in 1911 and in the following year joined the Yorkshire Electric Power Co., holding the successive appointments of second assistant engineer, operation department, and superintendent, testing department. In 1919 he was appointed technical assistant to the Salford city electrical engineer and from 1929 to 1948 was technical engineer, South-East and East England District, Central Electricity Board.

Mr. J. Williams

Mr. E. B. Powell

Mr. Powell entered the electricity supply industry after studying at Loughborough Technical College, being appointed senior charge engineer with the St. James and Pall Mall Electric Light Co., and later became assistant resident engineer. He joined the London Power Co. in 1928 being engaged on system operation; in 1945 he was appointed chief assistant operating engineer, becoming executive engineer (operation) in 1947.

During the recent Convention of the Association of Mining Electrical and Mechanical Engineers held at Blackpool, 150 members and their wives were invited to the Works of **W. T. Glover & Co., Ltd.** The delegates travelled by coach from Blackpool. Lunch was arranged at the Grand Hotel, Manchester, and Mr. Fairfield, director and general manager of Glovers, welcomed the visitors, who included the national president Mr. F. J. Hopley, and the president elect Mr. H. Watson-Jones. After tea, the visitors were given a " send off " by Mr. S. Winstanley, assistant sales manager of Glovers, who organized and acted as chairman for the visit.

Members of the Association also paid a visit to the Prescot works of **British Insulated Callender's Cables, Ltd.**, during the Convention, and saw among other things the extrusion of copper sections.

The national final for the **Electrical Industries National Golf Championship** will be held at the Worthing Golf Club on 13th and 14th October. On the first day the national final for the Sir Montague Hughman Trophy, the Veterans' Cup and the national foursomes competition will be played, followed in the evening by a dinner at the Assembly Hall, Worthing. The Visitors' Trophy Competition will be played on the following day. Qualifying cards can be obtained from, and should be returned to, the local area secretaries. Further information can be obtained from Mr. W. J. Bird, national hon. secretary, Magnet House, Kingsway, W.C.2.

The inter-company sports meeting of **British Driver-Harris Co., Ltd.** (with headquarters and works at Manchester and Cheadle, Cheshire) and **Ripaults, Ltd.**, is held annually, alternately at Cheadle and Enfield. This year's meeting, on 21st June, was at Cheadle, where members of the two organizations competed for the Parry/Roberts trophy. (Mr. R. M. Parry is managing director of British Driver-Harris Co., Ltd., and Mr. G. A. Roberts is managing director of Ripaults, Ltd.) Ripaults were the decisive winners and thereby retain the trophy for another year.

On 21st June nearly 400 employees of **E. K. Cole, Ltd.**, went for their annual outing to Great Yarmouth for the second successive year. The journey was made by coach through parts of Essex and Suffolk not previously visited on " Ekco " outings. After stops at Sudbury and Diss the coaches stayed at Oulton Broads for the afternoon and finally reached Great Yarmouth in time for tea on the Britannia Pier. The return journey was planned so that coaches could return independently according to the wishes of the passengers.

OBITUARY

Mr. J. S. Lythgoe.—The death occurred on 18th June, in hospital, of Mr. Joseph Sugden Lythgoe, A.M.I.Mech.E., who had for the past twenty-five years represented the Albion Clay Co., Ltd., in the North of England, North Wales and Scotland. He was sixty-four.

Mr. Fred Mew, sales manager of Desoutter Bros., Ltd., died on 18th June.

ELECTRICAL WHO'S WHO

The second edition of this useful reference book is now available. It contains brief biographies of over 4,000 men and women in all branches of the electrical industry and profession. Copies are obtainable at 12s 6d (postage 8d) from all booksellers or the Publishing Dept., Dorset House, Stamford Street, London, S.E.1.

I.E.E. Meeting in Dublin

Inspection of Peat-fired Stations

OVER 200 British members of the Institution of Electrical Engineers saw the newest and oldest aspects of the capital of the Republic of Ireland during their four-day summer meeting in Dublin last week. The party arrived on Tuesday, 24th June, and the social round began with a reception and smoker in the Metropole restaurant, where Dr. George Little, of the Old Dublin Society, read a paper on street lighting in the city.

On the Wednesday the party was divided into groups for conducted tours to, among other places, the Electricity Supply Board's 110 kV transformer station and the Aberdare Electric Co.'s factory at Finglas, and the Aer Lingus (Irish Airlines) workshops at Collinstown. A fourth group chose a coastal sightseeing trip.

After luncheon on Wednesday a number of the visitors went to the automatic telephone exchange and on to the Land Despatch department of the G.P.O., while the remainder went to the Guinness brewery to inspect the new power station. On the same evening the entire party attended the annual conversazione and dance given by the Institution's Irish Branch.

Visit to Clonsast

The outstanding event of the four-day meeting, from the viewpoint of technical interest, was the visit on Thursday to the Bord na Mona (Irish Peat Board) bog at Clonsast and an inspection of the E.S.B.'s peat-fired generating stations at Portarlington and Allenwood.

The British Electricity Authority's chief engineer, Sir John Hacking, commented afterwards that the Clonsast peat-cutting mechanical equipment was "something new in his experience and surprisingly complete." He understood that the Irish authority had more machines on order, which would further reduce the manual handling involved and would lead to the complete mechanization of operations.

The Irish peat-fired generating stations, he said, were basically the same as their coal-fired counterparts in Britain, except that the output was smaller. He thought they were highly efficient and a fine achievement of and tribute to Irish engineering. At Clonsast the visitors had travelled on the six-mile-long narrow-gauge railway, seen the excavators at work and watched a mechanical loader.

At a luncheon given afterwards by Bord na Mona, the visitors were welcomed by Mr. C. S. Andrews, the managing director, who told them that peat could not be won easily and cheaply. Last year's production totalled 146,000 tons and they hoped to have a greater output this year.

A Paying Proposition

Sir John Hacking, returning thanks, said he was glad to hear that the Peat Board's work was a paying proposition and he hoped it would become even more so. Mr. B. O'Mongain, B.Sc., chairman of the I.E.E. Irish Branch, also thanked the Board.

The Irish Minister for Posts and Telegraphs, Mr. Erskine Childers, acted as host on the same evening to the visitors and to fifty members of the Irish Branch, at Iveagh House. Sir John Hacking, conveying thanks to Mr. Childers, mentioned that he had been invited to a talk with Mr. Eamon de Valera, the Taoiseach (Prime Minister), during the afternoon. Mr. de Valera, he said, had shown great interest in several problems facing electrical engineers, and spoke of the difficulty of utilizing the heat wasted through generating station condensers, the economics of diversion of that heat for domestic use, and the possibility of harnessing tidal energy.

On the Friday, the British visitors went to the hydro-electric generating station of the Electricity Supply Board at Poulaphouca, making a roundabout trip which took in Glendalough, famous Co. Wicklow beauty spot. That night the E.S.B. gave a dance attended by the Minister for Finance, Mr. Sean MacEntee.

On the Saturday came a party given by the president of University College, Dublin, Dr. Michael Tierney; a coach tour of the city; and an evening at the theatre.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Domestic Fuel Costs

I AM sorry to be so late in replying to "Curious" (*Electrical Review*, 13th June) on the matter of my low fuel bills; but I have now dug up the actual receipts and they read as follows (for 1951):—

Quarter	*Electricity*	*Gas*
1st	£3 1 6	£3 1 6
2nd	2 9 2	2 0 9
3rd	1 1 3	1 5 2
4th	2 6 9	2 7 0
	£8 18 8 +	£8 14 5 = £17 13 1

The reasons for this, I am afraid, will not help "Curious" very much: he has a house roughly twice as large as ours and a family exactly twice ours. Also, he has a bathroom, presumably.

Our cottage is a small, terraced one; the four main rooms (two reception and two bedrooms) measure only 10ft by 11ft, the third bedroom and the kitchen being 8ft by 9ft, with a very small hall and upstairs landing 4ft by 5ft. Thus the total space to heat is very much smaller than that in a more spacious and less compact four-bedroom house. Owing to the absence of a bathroom, we have had one of the new shower cabinets installed: it has given us excellent service and proved to be very economical, since one tends to wash quickly in a shower, using a minimum amount of water and fuel.

Perhaps I should add that so far as electricity is concerned we are operating on the very economical "standing charge" system (12s 6d per quarter in our case).

By the time our one daughter has three brothers or sisters I expect we shall have moved into a larger house, and, although we shall try to apply some of the experience we have had here, our bills for fuel will probably approximate those of "Curious."

*London, S.E.*20. IAN S. MENZIES.

Electro-Mechanical Timer

I WAS interested in the electro-mechanical timer described in your issue of 27th June. I first met this arrangement some fifteen years ago in the telephone industry where it was used to measure time intervals and to provide measured impulses. More recently it has also been used for timing purposes in the manufacture of thermal starter switches for fluorescent lamps.

Ilford, Essex. W. R. BLOXSIDGE.

ANGLO-AMERICAN EXCHANGE

WE have had a letter from Mr. Floyd D. Parker, of Portland, Oregon, U.S.A., in which he says:—

"It was my very good fortune to have been a member of the U.S. Electric Light and Power Study Group that recently toured the electrical utility scheme of Britain as guests of the British Electricity Authority. It was a wonderful experience for me and I enjoyed every minute of my stay.

"The opportunity of visiting so many installations of the Authority, meeting so many of its management, supervisors and workmen, visiting historical spots of interest and viewing something of the British way of life was indeed a rare opportunity. It was something I shall always remember and I trust that the friendships established will flourish. I found the British people cordial, co-operative, hospitable and most anxious that our trip should be a success."

We can assure Mr. Parker that the visit of his party was greatly appreciated here. We are sure that the interchange of experience on this occasion and during similar visits paid to the United States by British electricity supply men has been of great advantage to all concerned.

I.E.E. North Midlands Students

THE third summer technical meeting of the Institution of the North Midland Students' Section of Electrical Engineers will be held in the offices of the British Electricity Authority, Whitehall Road, Leeds, on 8th July, at 6.45 p.m., when Mr. J. C. King will give an address on "Design, Performance and Testing of Aircraft." Provisional arrangements have been made for the annual summer outing to be held on either 30th August or 13th September. It is proposed to make a tour of part of Derbyshire.

Cable Industry Inquiry

Monopolies Commission's Recommendations

SINCE March, 1949, the Monopolies and Restrictive Practices Commission, of which Sir Archibald Carter is chairman, has had under review conditions relating to the supply of insulated electric wires and cables and its report, containing a number of recommendations, was issued on Tuesday last.

The report recognizes that "in an industry in which quality is of supreme importance, British cable makers have gained a reputation which is world-wide." The United Kingdom has been the leader in cable development and production, and to-day the British industry claims to have the biggest cable export trade in the world, producing large sums of foreign exchange both directly and from installation work. It concedes that the Cable Makers' Association has played a predominant part in this, though the production of first-quality cable "is by no means confined to C.M.A. companies."

Organization of Industry

Surveying the organization of the industry, the report states that there are at present some 60 concerns engaged in the manufacture of cable in the United Kingdom, 22 being members of the C.M.A. or the Covered Conductors Association, while seven are associated with members. In 1948 these manufacturers were responsible for 82·7 per cent by value of the total supply of electric wires and cables in the country (80·1 per cent in 1950). The Independent Cable Makers' Association has at present 13 members, all of whom make rubber and plastic cable and nine make only this type of cable. In 1948 these were responsible for 9·6 per cent of the supplies of cable in the home market (9·8 per cent in 1950). Three of the four largest independent cable makers, however, are not members of the Association.

Dealing with the operations of the C.M.A. and C.C.A., the Commission observes that a common price has always been a leading feature, but the Associations "claim with truth to be something more than price rings." Both Associations have established minimum standards and insist on a high level of quality. The C.M.A. in particular has for many years supervised the quality of its members' products by arranging regular performance tests and by this means has built up an immense prestige. The report expresses the view that this high standard of control of quality has been of great benefit and that the restriction of members' freedom which is involved in their having to submit new designs and types to the C.M.A. or C.C.A. for approval before they are put on the market is a necessary concomitant and has been reasonably administered.

Common Prices Deprecated

With regard to common prices, the Commission "sees some force" in the argument that collaboration on standards of quality and in techniques of manufacture would be likely to be less close if members were engaged in price competition, and the present high standards of quality might not in all cases be maintained. The Commission says, however, that the B.S.I. specifications are a considerable safeguard and much useful work is carried on by individual concerns and by research associations. It is pointed out that the prices agreed by the C.M.A. and the C.C.A. are not merely minimum prices; the members are as much precluded from charging higher prices as lower. The consequencse are that the whole system of competitive tendering is vitiated so far as the members are concerned.

The report goes on to consider in detail the position in the various sections of the industry with regard to the strength of independent competition; the level at which the common price is maintained and relation of this price to the costs of the different makers; and the bargaining strength of the buyers.

The Commission concludes that a system of purchasing mains and h.v. cable which is in the long-term interests of both the consumer and the producer will have to be

worked out with the industry by the British Electricity Authority. The present arrangement for C.M.A. members' costs to be investigated by independent accountants is considered to be in the public interest. It is recommended that prices to buyers other than the B.E.A. should bear a direct relationship to those charged to the B.E.A., which should be made known.

Rubber Cables

Passing on to a consideration of rubber cables, the report states that the proportion of the home market supplied by independent makers is slightly larger than in the case of mains cables, but the resulting competition appears to the Commission to be considerably less effective. Some independent makers "admit that they welcome the C.M.A. common prices and fix their own just below them" and those who are members of the I.C.M.A. have their own set of minimum prices for sales to wholesalers and contractors.

The Commission concludes that the pricing method adopted by the Rubber Cable Manufacturers' Association cannot be justified. According to the C.M.A. evidence, prices are arrived at by taking the average costs of the five lowest-cost producers who submit them, then adding profit rates which vary from product to product, with a further 12½ per cent to cover "pay-aways." The average profit rate aimed at is 25 per cent on total costs. The actual rates added to each product are stated to be calculated on the general basis that the types in greatest demand carry the lowest profit and to range from 9 to 32 per cent. The Commission remarks that the additions appear in practice to be highest where the spread of costs is greatest and so to ensure, in some cases at any rate, a profit even to the highest-cost producer. The percentages have remained constant for some years in spite of considerable changes in costs.

The view is taken by the Commission that there is so much variation in costs between one member and another that there should be scope for price reductions. It recommends that the system of common prices for rubber cable and the C.C.A. system for covered conductors should be brought to an end. As a defence against extreme price cutting the C.M.A. and C.C.A. should be allowed to fix minimum prices giving no more than a reasonable profit to the lowest-cost producer of each type of cable. If minimum prices are established on this basis, costs and profits should be reviewed by the appropriate Government Department from time to time.

So long as there is no independent competition in submarine telegraph cable the periodical cost investigations now made are clearly desirable. Submarine telegraph cable is outside the international agreement and the report adds that it is important that it should remain so. It is suggested, with regard to land telephone cable, that the G.P.O. should leave itself free in future to place a proportion of orders with independent concerns and should take steps to ensure the protection of public interest in all its purchases of telephone cable outside bulk orders. Price agreements for sales of telephone cable to purchasers other than the G.P.O. should be brought to an end. If further bulk orders are placed, provision should be made to ensure efficient independent competition.

Sharing Orders

The report goes on to discuss arrangements made for the sharing of business by quotas. The conclusion is reached that it is clearly against the public interest that there should be any sharing of business in advance over long periods irrespective of changes in the relative efficiency of the different companies, and the Commission recommends that the arrangements should cease and also that the allocation system operated by the C.M.A. members and others—in recent years on a much reduced scale—should be brought to an end.

The Commission is satisfied that neither the C.M.A. nor the C.C.A. is to-day following a policy of limiting competition by restriction of capacity. As regards a covenant by British Ropes, Ltd., undertaking not to make cables, this should be allowed to lapse.

The co-operation of the C.M.A. and the C.C.A. on the questions of quality clauses in B.S.I. specifications is welcomed. The Associations' policy on patents is considered to be liberal and no recommendation is made thereon.

It is recommended that exclusive dealing provisions in agreements with wholesalers and other buyers of rubber cable should be brought to an end as also should the aggregated quantity rebates and association rebates.

E. C. A. CONFERENCE

BUSINESS AND SOCIAL EVENTS AT EASTBOURNE

MORE fortunate with the weather than they were last year at Harrogate, members and guests of the Electrical Contractors' Association meeting at Eastbourne this week at their annual conference were in good spirits and the event was a great success. At 650 the attendance was rather lower than last year, but that marked the Association's Jubilee—which was, of course, a special occasion.

The proceedings started on Monday with a meeting of the Council. During the luncheon interval the opportunity was taken of presenting a silver salver to Mr. Stanley N. Watkins, the President, in recognition of his services to the Association during the past year.

In the evening, the president and Mrs. Watkins, accompanied by the Mayor of Eastbourne, Alderman E. C. Martin (who is himself an electrical contractor) and Miss Betty Martin, received the delegates and their ladies at the Winter Garden. The presence of Lord and Lady Citrine was appreciated as a gesture of friendliness from the British Electricity Authority. A dance and cabaret followed the reception.

Mr. T. E. Alger presenting the President with a silver salver; Mr. L. C. Penwill in background

Business began on Tuesday morning at the Winter Garden when the Mayor welcomed the Association to Eastbourne. After thanking His Worship, the President delivered his address an abstract of which follows The address was a useful commentary on the questions which are currently exercising contractors' minds.

Next came the introduction of his paper on "Accounting for Electrical Contractors" by Mr. F. Sewell Bray. The discussion was opened by Mr. S. L. M. Barlow who was followed by Messrs. H. M. Drake, F. W. Blanshard, M. R. H. Sadler, A. Apps, S. A. Ponton, A. J. Stiling, W. F. Furse, G. W. Hands and C. C. Hyams. Among the points raised were the dissimilarity of manufacturing and contracting businesses, the application of overheads to work in progress, the difficulty of applying the same methods of accounting to large and small contracts, the degree and cost of stock control, the definition of "expenses" for income tax purposes and specialisation of accountants.

Mr. Bray replied to the questions put to him, reminding the delegates that he was only an accountant, not an electrical contractor. He agreed that accountancy was not an exact science; in fact he regarded it as more of an art than a science. After all accounts were only a method of ensuring that no more was taken out of a business than was put into it.

Tuesday afternoon was left free and those who were active enough in the intense heat explored Beachy Head, Pevensey and various other places of interest in the vicinity. A reception was held by the Mayor and Miss Martin in the evening and again there were a dance and cabaret.

The annual general meeting was held on Wednesday morning and after lunch the members reassembled at the Winter Garden

to hear and discuss Mr. H. S. Wathes' paper on "This Business of Electrical Retailing." There followed the installation of the new President, Mr. W. T. Trace, and votes of thanks to all who had contributed to the success of the various functions. Messrs. S. L. M. Barlow and J. R. Halliwell are the new vice-presidents with Mr. A. F. Plummer who already occupied that position. A further report of the discussions will appear in our next issue. At the Winter Garden in the evening a dance and smoking concert concluded a very well-organised and happy conference.

Presidential Address

By Stanley M. Watkins

IN the first part of his address on Tuesday morning Mr. Watkins recalled that last year the Association celebrated its golden jubilee and he looked towards the next fifty years. He considered that the future would be revolutionary rather than evolutionary; electricity supply would develop to an extent which could not now be visualised.

Turning to immediate problems of interest to the Association and its members, the President said that he found them similar to those which existed at the commencement of their operations. He did not intend to deal with the technical side which could be safely left to the Association's very active Technical Committee. His subject was the present and immediate future of the commercial and trading aspects of electrical contracting and retailing and its relationship with industry as a whole, its customers, and professional and other bodies acting for them.

He thought that in respect of the manufacturers they were in a happier state than had existed in the past, although they were not perfectly satisfied with trading conditions. Referring to the report on the electric lamp industry by the Monopolies Commission, Mr. Watkins said that there was no appeal from the Commission's judgment. It appeared to him that industry and commerce were the victims of a parliamentary system in which political considerations seemed to be of prime importance.

The lamp industry report suggested that those responsible for this country's commercial and industrial success in the world's markets could no longer be trusted to perform their legitimate task and were to be overridden and controlled in a manner which was the negation of the spirit of enterprise. It should be noted that neither the Commission nor the Government had so far attempted to interfere in the science governing the production of the article in question, but it did not seem to be appreciated that its marketing was equally a matter for experts and not politicians.

The public had a right to be safeguarded but there were only two questions which should form the subject of investigation—whether the price was fair and reasonable and whether effective and efficient service was available. If the answer was in the affirmative there was no justification for bureaucratic interference with a well-tried trading structure. Strangely enough, certain of the recommendations of the Commission were opposed to the representative views of the public expressed to the Government committee of inquiry into price maintenance.

The "profit motive" became a crime when it meant a reward for industrial and commercial initiative, but apparently it was a virtue in the field of labour relationship which seemed to be based on the highest possible weekly wage packet with the lowest possible number of hours of production and the longest possible holidays with pay. Mr. Watkins said he was in favour of the shortest possible working week and the highest possible wages consistent with productive effort, but were we getting production commensurate with the number of hours worked and the payment for it? He repeated the plea of his predecessor for the highest degree of co-operation among all in the industry. An increase in productivity would quickly bring with it rewards which all would welcome.

Mr. S. M. Watkins

On the platform at the Winter Garden: (1) The Mayor of Eastbourne. (2) The President. (3) Mr. F. Sewell Bray. (4) Mr S. L. M. Barlow. (5) Mr. H. M. Drake. (6) Mr. F. W. Blanshard. (7) Mr. M. R. H. Sadler. (8) Mr. A. Apps. (9) Mr. S. A. Ponton. (10) Mr. A. J. Stiling

During the year they had had meetings with the British Electricity Authority but not with the degree of success they would have wished, although he paid tribute to the way in which their points of view had been received by the representatives of the B.E.A. and Area Boards. Members of the E.C.A. did not fear fair competition; if the private contractor was unable to survive in those conditions there was little cause for complaint They did not believe that the B.E.A. desired to use its unique opportunities to secure advantages over the private trader, or that any responsible person in the electricity supply industry wished to subjugate the private contractor by unfair or subsidised competition.

Unfortunately certain public authorities confined their work to the appropriate Area Board without giving the private trader an an opportunity of submitting a tender. There were other authorities who employed their own electrical staff and excluded the electrical contractor. Mr Watkins thought that such authorities were oblivious to the interests of their ratepayers; it was their duty to obtain service at the lowest economic price, subject to the maintenance of quality and efficiency.

The E.C.A. Council had given particular attention to the retailing activities of the members and for this purpose had established a National Committee on Electrical Retailing consisting of twenty members elected by the Sections. He had no doubt that the Committee would render useful service not only to members of the Association with wide retail interests but also to legitimate electrical retailers outside their ranks. Provision had been made for them to enter N.E.C.T.A., Ltd., and it was hoped that all with the necessary qualifications would ally themselves with the Association.

One disability from which the retailer suffered was the absence of any reasonable guarantee that in the event of the abolition or reduction of purchase tax he would be reimbursed in respect of the amount already paid. Active representations had been made to the Chancellor of the Exchequer on this subject. Far too large a proportion of a retailer's capital was swallowed up in financing purchase tax requirements with no return—an iniquitous system.

The electrical industry must pay proper attention to the need for after-sales service of electrical appliances. So frequently members found that no arrangements had been made for this service by those who reaped the full profit from the apparatus in question. It was time that all manufacturers of appliances operated a standardised system of ensuring that service was easily available to the customer and that there was an adequate reward for those who undertook such service.

Manufacturers should make it clear in their advertisements that the price of apparatus did not include the cost of installation. Either the trade discount should be sufficient to

recompense the retailer for the cost of installing apparatus or there should be an agreed additional charge, advertised to the prospective purchaser.

Mr. Watkins appealed to members to go out for specialisation in after-sales service instead of endeavouring to cover the whole field, if possible coming to arrangements with fellow members to establish for each a clearly defined field of specialisation.

Speaking of labour relations, the President said that with the Electrical Trades Union they had a small committee examining certain aspects of the labour structure. The committee's work was interrupted by a dispute involving a serious question of principle but it was hoped that the resumption of negotiations with the E.T.U. would enable a renewed study of the problems to be made. In the very near future members might be asked for their views on the matters which had been under consideration. The development of human relationships between employer and employed was the basis of economic and efficient service to the public; he regretted that party politics too frequently entered the field of industrial negotiations.

With regard to the shortage of materials, Mr. Watkins said that whatever criticism they might have of the lack of foresight which was responsible for the present position and whatever their views might be on the unrealistic conditions imposed by the methods of control, the fact remained that steel was desperately short and they must all plan accordingly.

Were contractors not a little conservative in their advocacy of the use of conduit in all circumstances? Conduit jobs were regarded as the best by the majority of electrical engineers but it would be unwise to ignore alternatives. In the meantime the Association was doing its best to allocate the available steel to contractors as efficiently and expeditiously as possible.

Active consideration had been given to the draft report of the Organizing Committee set up to consider the establishment of a National Inspection Council but they had yet to make a decision on the proposal which had been put forward. Grave consideration had to be given to the question whether, in the light of the Association's fifty years' experience, it was possible to achieve safety in installation work and the use of appliances on a voluntary basis. It was highly important that the industry did not embark upon a scheme of voluntary registration unless it was fully satisfied that the results would be commensurate with the time and money it was proposed to spend.

Throughout practically its whole existence the Association had advocated the compulsory registration of the contractor and the operative. An experiment had been tried in the voluntary field without anywhere near the success which was thought to be possible at the outset.

Relationships with kindred bodies had been maintained at a high level. A new agreement had been negotiated with the Royal Chartered Surveyors' Institution governing charges for daywork as an extra to a lump sum contract.

After a commendation of the good work of the Electrical Industries Benevolent Association, the President referred to the Association's move to its new headquarters at 14, Bedford Square, W.C.1. He concluded with thanks to his two vice-presidents, Messrs. W. T. Trace and A. F. Plummer, and to the Director and his staff. He congratulated Mr. Penwill upon the honour of C.B.E. recently conferred upon him.

Accounting Methods

By F. Sewell Bray, F.C.A., F.S.A.A.

IN this paper the author stresses the importance of proper accounting to enable a firm to shape its policy as well as to keep in sight its financial position. He states the primary purposes of accounting as the measurement of profit and loss over a given time and the ascertainment of the net assets at the close of the period. In addition there is much to be said for a statement showing the source and application of funds devoted to capital requirements.

A daily-kept cost record of receipts and payments is essential and the amount and quantity of commodities purchased on a credit basis must be carefully recorded, analysed into categories, e.g., cable, lamps and appliances. Debtor and creditor ledgers are an intrinsic part of any accounting system, entries being made from the purchase and sales records and from the cash transactions. A private, or nominal, ledger must

(1) Mr. and Mrs. A. Gould. (2) Mr. and Mrs. R. L. Lowe, Mr. P. G. Lowe and Miss I. J. Smith. (3) Mrs. C. R. Bates, Mrs. J. G. Briggs, Mr. and Mrs. W. C. Huston, Mr. and Mrs. R. D. Patterson and Mr. C. R. Bates. (4) Mr. A. F. Plummer and Mr. L. R. John. (5) Mr. K. P. Buckett, Mrs. N. H. Taplin and Mrs Buckett. (6) Mr. A. V. Milton with Mrs. T. R. Jones, Mrs J. R. Halliwell and Mrs. W. T. Trace. (7) Mrs. Tucker, Mr. and Mrs. G. Hayman and Mr. Tucker. (8) Mrs. Veness, Mr. A. J. Stiling, Mrs. N. G. Stock & Mrs. Stiling

be kept; this summarises transactions affecting the measurement of profit or loss and gives a plain indication of the net assets. There must also be a wages and salaries record and a systematic note of the transit of goods inwards and outwards.

Mr. Bray gives an example of a simple form of profit and loss statement which shows the gross profit and its percentage to sales, the profit before taxation, and the net profit. It is noted that if trade is reasonably constant the margin on turnover should also be reasonably constant. Expenses which vary with turnover are controllable; if they are out of proportion something is awry.

The author then goes on to deal with the methods of charging income tax, profits tax, and excess profits levy to companies and individuals. It is disquieting that there is a difference between "commercially prudent" profits and those subjected to taxation although the author hopes that in due course the gap will be closed.

Next the balance sheet is dealt with and a

simple form is included in the paper. By this means the net assets of a business (or capital employed) are arrived at; the profit they earn should bear some identifiable relationship to the capital employed.

It is necessary to have a statement showing how profits earned in an accounting period have been applied. If the working capital of an enterprise decreases during the period it suggests that the current resources are decreasing. This does not necessarily signify losses but it may mean that expenditure on current assets is proceeding too quickly; possibly that the stock of goods is increasing in a manner inconsistent with the turnover.

An inventory account should be kept to assist in the preparation of accounts at periods of less than a year without taking a physical count. For this purpose subsidiary records must be maintained to reflect the cost of materials purchased and their selling value.

In adding an amount for gross profit in estimates the author favours the application of two percentages, one to purchases and the other to wages. The first should cover expenses of moving commodities to site and provide a small profit; the other should be sufficient to cover administration, selling and financial expenses, and give a margin of profit.

Reference is made to "standard costing" which depends on the economic planning of physical performance. This planning is primarily the task of the technician who is required to advance such methods of utilising resources as will economise inputs and maximise outputs. The accountant then values the physical standards in terms of cost. Actual operating costs should be set alongside predetermined costs; discrepancies should serve to draw attention to any shortcomings in the organisation.

Stress is laid upon the necessity for preparing accounts as soon as possible after the close of the accounting period. The author points out that the accountant functions at the right hand of management of industrial enterprise. He helps to keep the business on an even keel and to determine its general direction and he provides information which assists in eliminating waste and promoting efficiency.

Mr. Bray then sets out a simple account for testing the efficiency of any department or process of a business or the whole of a business. It rests upon the assumption that a profit and loss account can be built up for each section of the business. Input allocations (labour and capital charges and operating income) are balanced against output value added. This form of account indicates how much of the operating profit has been derived from labour and how much from capital. In time it should be possible to determine the right proportions between the two to achieve maximum output. It is possible to obtain a reliable percentage between operating income and that of output which should be maintained consistently if the department is effective.

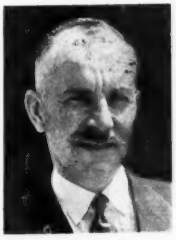
Retailing for Contractors

By H. S. Wathes

SOME E.C.A. members whose activities are confined to contracting may think that selling things in a shop is an easy, if tiresome, business. Actually it is an exacting and highly skilled profession.

Premises are the first consideration. Their size and magnificence depend on the finance available and the potential business, but there are factors common to all. Selection of a site may be governed by the tendency of pedestrians to walk on one side of a street. Bus stops should be avoided, as should the neighbourhood of public buildings, banks, etc.

Bold window displays (on ground floor level), an easily negotiated entrance and plenty of ground floor space are essential. The style of the premises should suit the class of trade aimed at; it is possible to be too lavish.



Mr. H. S. Wathes is Chairman of N.E.C.T.A. Electrical Retailers' National Committee.

Mediocrity in the staff is to be avoided at all costs. Customers should be approached sympathetically and with knowledge. There must be a high standard of supervision of sales staff, by the principal himself or a competent and conscientious manager.

Selection and buying of stock is the most

(1) The President and Mrs. Watkins receiving Mr. and Mrs. S. L. M. Barlow. (2) Mr and Mrs M. R. H. Sadler. (3) The Mayor and Miss Martin greet Mrs E. R. Gardiner. (4) Mr. W. J. Bird. (5) Lord and Lady Citrine with the President. (6) Major and Mrs. Drummond and Dr. H. H. Ballin. (7) Mrs A. C. Sharpe, Mrs. K. E. Hibbins, Mrs. H. C. Stokes and Mr. and Mrs. W. A. Gazard. (8) Mr. A. G. Gray, Mr. H. V. Newton and Mr. and Mrs. G. F. Gray. (9) Mr. and Mrs. A. E. Iliffe. (10) Mr. and Mrs. F. S. Boucher. (11) Messrs. W. Cottrill, A. H. Harborow and Mr. A. H. Goude.

difficult problem facing the retailer. He need not, and should not, handle a completely comprehensive line of appliances and fittings. He must decide what articles can produce an adequate volume of business and satisfy most of the demands of potential customers. Mr. Wathes says that his company does not stock decorative lighting fittings; the large stores can beat it in the lower-priced ranges and the business in good-class fittings would not compensate the company for the inevitable stock depreciation.

It is better for a retailer to refer a customer to another reputable firm than accept an order for something of which he knows nothing and on which he may be unable to give adequate service. It is also bad policy to try to sell a customer a substitute for what he really wants.

Mr. Wathes regrets that the electrical retailing industry as a whole let radio slip away into other channels of distribution. He says that if his contracting department showed as good a profit margin as his radio department he would be in a "very happy position."

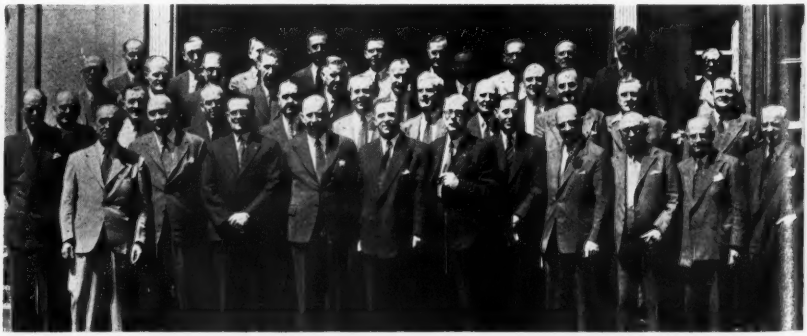
Display is important and is governed by taste and the class of trade. Overcrowding should be avoided and a display should be changed as frequently as possible. It pays to advertise; the local Press should be used, not necessarily in an expensive way. Selective circularising is an excellent promotion medium. Accounts which appear to be dormant should be followed up by a suitable letter or a personal call. A radio customer may be persuaded to place his refrigeration service in the firm's hands. Personally, the author deprecates house-to-house selling. He considers that an attractive commercial vehicle is an excellent way of keeping a firm's name before the public.

It is thought that a very small proportion of retail sales staffs to-day really do any selling. Sales staffs must know all about the products they are handling as well as those of competitors—but they must never criticise competitors' products. Training in demonstration is essential. Mr. Wathes says that he cannot over-emphasise the importance of thorough demonstrations both to prospective purchasers and again after a sale has been completed—preferably in the customer's own home.

After-sales service must be arranged, even if it means employing a third party. Good after-sales service is a business builder and may turn an occasional "unfortunate incident" into a valuable sales asset. It is well worth while to have a service man call occasionally on a customer without being sent for.

There are constant demands for bigger discounts but this may not be in the best interests of the industry as a whole and the general public. As a basis for discussion Mr. Wathes suggests that there should be a relatively low basic trade discount to provide an adequate reward for merely meeting a customer's demand and not actively selling. In some cases a reduction of present rates of discount might be beneficial to the industry. There might be an increased discount on a quantity delivery basis and the possibility of a bonus on total purchases over a period.

This would assure the manufacturer of an active selling organisation; the public would benefit by better service; and the retailer would receive a reward for his energy and initiative.



Members of the E.C.A. Council at the Grand Hotel

New Books

Equivalent Circuits of Electrical Machinery. By Gabriel Kron. Pp. 478; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 80s in the United Kingdom.

This book is an entirely self-contained exposition of the art of expressing the behaviour of electrical machinery in terms of static "equivalent" circuits for all operating conditions except hunting, the amplidyne and the metadyne being excepted. Here, a tensor is represented, not by a set of mathematical symbols in matrix form, but by a set of electrical symbols, and this is the difference between the present book and Kron's earlier works. The underlying principle of developing a "primitive" in the first place, and then expanding it, has been followed in this book as in the former ones.

Never before have equivalent circuits been treated so extensively and thoroughly although, as the author points out, these circuits, as such, are not new. Even if complications do arise in the case of machines with d.c. excitation the author has done a good job well and now that the "matrix" form has been followed by "circuits" it only remains to collect and arrange "vector" diagrams to have electrical machine theory in its three main forms of exposition available really complete and compact.—F.J.T.

Mathematics—Queen and Servant of Science. By E. T. Bell. Pp. 437 + xx; figs. 36; index. G. Bell & Sons, Ltd., 6, Portugal Street, London, W.C.2. Price 21s.

The title of this book conveys to some extent the awe and devotion of a mathematical professor to his deity, and leaves the prospective buyer in doubt as to the relative merit of both subject and book. Two early chapters are staggering. One attacks the subject of mathematical truth, which seems to turn on philosophy, and reminds one of Dr. Joad's answers beginning, "It depends what you mean by . . ." The other starts with postulates and leads to the "art of abstraction." Here the author succeeds in proving that $a \times b$ is not necessarily equal to $b \times a$, a fact which few who have read anything on vector analysis will dispute, but a hard pill to swallow if no concrete example is given.

The main objection to the book is that the going is unnecessarily hard, and that while the mathematician undoubtedly progressed historically in the manner in which this book is written, such is not the easiest way to find a path oneself.

The subject matter also includes algebra, matrix algebra, graphing, complex numbers, theory of equations, from Cartesian co-ordinates via Riemannian geometry to Einstein (in 30 pages), theory of numbers, astronomical digressions, differentiation and integration with conformal mapping (in 36 pages), waveform and probability.

The style of the book is interesting, but its appeal is likely to be very limited. It is not a text-book and although it travels far it does so in short rushes. When anything useful appears, it is immediately despatched at speed. Perhaps the mathematician is the very man *not* to write a book for the public.—E.H.S.

Books Received

Foundations of Electrical Engineering, Vol. I. By H. Cotton, M.B.E., D.Sc., M.I.E.E. and E. W. Golding, M.Sc.Tech., M.I.E.E., Mem.A.I.E.E. Pp. 301; figs. and index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 20s.

Thermionic Valve Circuits. By E. Williams, Ph.D., B.Eng., M.I.E.E., M.Brit.I.R.E. Third edition. Pp. 314; figs. 213; index. Sir Isaac Pitman & Sons, Ltd. Price 21s.

Fundamentals of Electronics and Control. By M. G. Young and H. S. Breche. Pp. 525; figs. and index. Hamish Hamilton, Ltd., 90, Great Russell Street, London, W.C.1. Price 48s in United Kingdom.

Elementary Mathematics. By L. W. Phillips, M.I.E.E., F.Inst.P. Pp. 339; figs. 147; index and answers to problems. Macdonald & Co. (Publishers), Ltd., 16, Maddox Street, London, W.1. Price 12s 6d.

Small Commutator Motors. By K. G. Graham. Pp. 283; figs. and index. Technical Press, Ltd., Gloucester Road, Kingston Hill, Surrey. Price 40s in the United Kingdom.

Tungsten. By C. J. Smithells, M.C., D.Sc., F.I.M. Third edition. Pp. 326; figs. 225; index. Chapman & Hall, Ltd. Price 75s.

Iron and Steel Productivity

THE higher productivity of both plant and labour in the American heavy steel industry may be attributed mainly to larger units of plant in larger works, the greater purity and abundance of raw materials, faster driving of plant and the use of high-grade fuel. These are the broad findings revealed in the report of the British Iron and Steel Productivity Team which visited the United States last year. American manning per unit of plant is generally lower than in Britain, despite higher outputs. Mechanical aids and handling equipment are used wherever practicable, both to economize on labour and to enable continuous operation at good speed.

In some works the electrical department is completely independent and responsible for electrical design and maintenance. In others the department is responsible to the superintendent of maintenance, who is usually a mechanical engineer. The manning of the electrical maintenance section is usually about one-third that of the mechanical department, and the electrical repair shops are generally small in proportion to the size of the whole works.

In one large company only motor repairs, up to about 500 h.p., are dealt with in the electrical repair shop. Field coils and brush gear parts are generally bought out, but all armature coils and armatures are wound in the shop. When a motor breaks down or requires repair, the whole unit is brought to the shop, even though it may be a mill type machine and require only an armature change. This is done so that a complete test can be made. This system is very effective and reduces breakdowns to a minimum. Control gear and starters are generally repaired and maintained locally in various parts of the works.

Of the 86·3 million tons of steel made in the U.S.A. in 1950 89 per cent was produced by the open hearth process. Electric steel production at 6·14 per cent of the total is, however, nearly four times what it was ten years ago. In Britain more or less the same trend is evident with a similar percentage of open hearth production and 3·33 per cent (compared with 2·45 per cent) of electric production out of the total output of 15·85 million tons.

The report is obtainable from the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1 (5s, post free).

Decreased Sales in East Midlands

THE serious effects of the recent decrease in electricity sales in the East Midlands—which he hoped would only be temporary—were pointed out by Mr. C. R. King, chairman of the Board, at a meeting of the Consultative Council last week. He said that if the fall continued on the same scale throughout the present financial year there might be a total loss of something like £2,000,000. The figures were very serious and immediate steps had been taken to economize wherever possible.

The accounts for the year ended 31st March last were not yet finally completed, but it had been known for some considerable time that the Board would have a substantial deficit. Because of the falling away in sales that deficit was larger than anticipated, and it would be necessary to transfer from the reserve account a very substantial proportion of the £1,000,000 now standing in the local reserve. Furthermore, the Board was faced with demands for wage increases from all classes of workers, including clerical, technical and manual, and if these were conceded the Board would be faced with increases totalling something like £330,000 in a full year. In addition, there were other substantial increases to be faced. The recent rise in postage charges, for instance, would cost the Board some £50,000 in a full year.

Mr. King said that the decrease in sales was first noticed last December. Up to February the reduction was relatively slight, but in March sales fell to 380 million kWh whereas, based on the normal rate of increase, sales of the order of 440 million kWh might have been expected. The maximum demand also decreased, but as the Board's m.d. for the year had already been established this could not reduce the cost of bulk supply. In April, sales totalled 331 million kWh, again representing a potential loss of 60 million kWh, while the m.d. increased by 7 per cent compared with April, 1951, so that the load factor fell from 57 to 50 per cent. In May 328 million kWh was sold and in that month the potential loss was only 40 million kWh, which might indicate that the slump was of a temporary character and that sales might pick up later in the year.

The fall in sales, said the chairman, had caused the Board to defer the introduction of standard commercial and farm tariffs. It was proposed to wait until the end of July or August so that a more accurate estimate of the costs to be met this year could be obtained. The Board was loath to increase charges until it became absolutely necessary. It would be better to run the risk of a further deficit than to increase tariffs prematurely and jeopardize sales.

FURNACE DEVELOPMENTS

Twenty-one Years of Progress in Electric Furnace Design

Twelve base rectangular bell furnace installation for annealing silicon steel sheets

EARLY in 1931, as an outcome of an agreement between Gibbons Bros., Ltd., and Wild-Barfield Electric Furnaces, Ltd., a new company was formed with the title of G.W.B. Electric Furnaces, Ltd. Gibbons had long been known as producers of large-scale fuel-fired industrial furnaces, while Wild-Barfield were one of the pioneers in the electric furnace industry, normally concerned with medium and small units. Business was commenced in premises at North Road, Holloway, but by 1939 the need for larger production space made it necessary to transfer to Dibdale Works, Dudley, where extensions have since been provided and recently a new office block has been added.

The company's first order was for a box-type sheet annealing furnace from the Northern Aluminium Co., Ltd., and it was the close investigation into the needs of the light alloy industry that led to the development of a means of high speed forced convection by centrifugal fans and directional air flow to impart heat to the charge. Heating up times were thereby reduced to approximately 50 per cent of what had previously been achieved when utilizing the common paddle type fan for low speed air turbulence. G.W.B. have also supplied a large quantity of equipment for most other types of non-ferrous and ferrous heat-treatment including the automobile and aircraft industries.

Present developments include the company's entry into the arc furnace field and several large contracts are in hand. Furthermore, in co-operation with the English Electric Co., Ltd., there will shortly be put on the market, induction heating equipment working on medium frequencies utilizing a mercury arc rectifier as a means of frequency changing. Low frequency induction heating and melting equipment can also now be supplied.

Apart from electric furnaces, G.W.B. are engaged in two other important activities. A separate works in Birmingham solely manufactures the case-hardening compound known as "Eternite," "Nokase" anti-carburizing mixture, "Kleenard" open hearth hardening compound and "Speedicase," a rapid case-hardening paste giving the speed of a liquid bath and used for fast medium depth work. The other activity concerns the development of electrode type steam raisers and water heaters. The former have such varied uses as dairy sterilization, tanning, granodizing and the provision of steam for the testing of locomotive valves. The water heaters are primarily designed for space heating in conjunction with thermal storage systems, and an example of this is the new plant at the North Western Electricity Board's Didsbury offices.

Switchgear Apprentices

FROM South Wales Switchgear, Ltd., we have received an illustrated booklet containing the names of about 270 apprentices who have been or are being trained by the organization. In a preface Mr. A. J. Nicholas (director) says that the apprenticeship scheme has been moulded on the best known practice and the works training, in conjunction with part-time college education, is giving the company a number of engineers with the Higher National Certificate each year.

Commerce and Industry

E.P.E.A. and A.M.E.E.

A STATEMENT appears in the June *Electrical Power Engineer* regarding relations between the Electrical Power Engineers' Association and the Association of Managerial Electrical Executive. It says:—

"Before vesting date, the A.M.E.E. confined its membership to chief engineers of electricity undertakings. There was therefore little risk of a clash of interest between the old A.M.E.E. and the E.P.E.A. Now, the A.M.E.E. recruits into membership all staff (engineering and non-engineering) whose salaries and conditions of service are governed by the National Joint Committee for Managerial and Senior Executive Staffs.

"The E.P.E.A. is strongly represented on the staff side of the National Joint Committee, accepts into membership and negotiates for all levels of managerial and senior executive staff who are engineers, and is the only organization for such staff which confines its interest to engineers. It considers it is better equipped to represent engineers and uphold their status in negotiations with the Electricity Boards than any other organization. The National Executive Council has therefore recorded its decision that dual membership of the E.P.E.A. and A.M.E.E. is undesirable."

Licence-free Building Limit Raised

Building Licensing Concession

In reply to questions in the House of Commons last week on the licence-free allowance for building work, the Minister of Works (Mr. Eccles) said that the potential demand for building and repair work was so great and the load on the building industry differed so much from district to district that it had been found impossible to make a general relaxation of the licensing system at this time. He was therefore making an Order—the Control of Building Operations (No. 17) Order (S.I. 1952 No. 1202)—continuing for the twelve months from 1st July the present limit of £500 for industrial and agricultural buildings, but increasing the limit for other buildings to £200. The position would be reviewed in the autumn and if conditions justified a change another Order would be made. In issuing licences for repair and maintenance above the free limits, careful regard would be had to the load of work in the area concerned.

Electricians' Wages

No agreement was reached at a meeting on 26th June when a claim was put in by the Electrical Trades Union for an increase of 3d an hour and alterations in grading for members employed by the British Electricity Authority and Electricity Boards. It was decided to refer the question to the Industrial Disputes Tribunal.

Promoting Electric Cooking

Electric cooking was the theme at a Press gathering arranged by the British Electrical Development Association last week. Women journalists predominated at the meeting at which Mr. V. W. Dale, general manager and secretary of E.D.A., gave an address of a fighting character. Quoting freely from Mr. J. A. Fraser's Power Convention paper on electric cooking, Mr. Dale put up a strong case for electricity on the grounds of economy, efficacy and efficiency.

His arguments were reinforced by the new "Electric Cookery Book" by Ester Purvis, copies of which were distributed. This contains a great number of recipes in classified order with directions for their preparation in and on electric cookers. They are prefaced by several pages on the advantages, methods of use and maintenance of the cooker and boiling plates

Display of cookers of various types and makes with a model of E.D.A.'s Food Fair stand in the foreground

together with other relevant information.

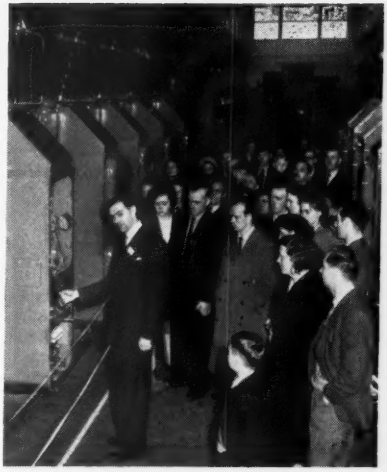
The Association also arranged a display of representative modern domestic cookers by the leading makers. With them was a model of the Association's stand at the forthcoming Food Fair (Olympia, London, 5th–19th July).

Engineering Wages Claim

Representatives of the Confederation of Shipbuilding and Engineering Unions last week presented a claim to the Employers' National Federation for an increase of £2 a week in the wages of adult male workers in the engineering industries to operate from 26th June. The claim carries with it proportional increases for boys and youths; a claim on behalf of women workers is to be submitted on 17th July. A reply was requested before the Confederation's annual conference in August; the employers undertook to consider the application and arrange for an early meeting.

Witton Works Visit

The "family visit" to the Witton works of the General Electric Co., Ltd., first introduced in 1949 is now an annual event of ever-increasing popularity, and on 14th June between 9,000 and 10,000 visitors toured the numerous workshops and laboratories on the Witton estate. Employees were free to conduct their families and friends through all sections of the works and specially printed maps were available to help those unfamiliar with the whole of the 150-acre site. Refreshment centres were provided by the company at a dozen different points. In the lecture hall of the new heavy engineering works a full range of the latest G.E.C. domestic appliances were on show in an "Electric Home" exhibition at which modern methods of electric cooking were demonstrated. The staff of the 2¼ million V laboratory entertained the visitors with spectacular displays of high voltage phenomena, and in other parts of the works demonstrations of foundry practice, dry battery manufacture and Bakelite moulding were given. The principal outdoor attraction was a magnetic sweep, a device designed to remove nails and other steel fragments from the surfaces of roads and airport runways, thus preventing damage to pneumatic tyres.



Visitors to the G.E.C. switchgear works inspecting a bank of 33 kV outdoor circuit breakers

Window Display Competition

The London Electricity Board held its second annual window display competition, open to members of all service centre staffs, in April this year, some fifty entries being received. Senior officers of the Board selected ten entries for submission to the final judging panel which consisted of Messrs. M. Black (Design Research Unit), M. Brumwell (Stuart Advertising Agency, Ltd.), and A. Symes (Display, Design and Presentation), whose awards were as follows:– 1st place: Walthamstow Service Centre; "Electricity in the Kitchen Makes the Kitchen Fit for a Queen." 2nd place: Edgware Road Service Centre; "Roll Away Clouds. Brighter Days, Brighter Ways. An Electric Kitchen Pays Always." 3rd place: Baker Street

Walthamstow Service Centre's winning display in the L.E.B. window display competition

Service Centre; "Electricity is so Worth While. Presenting 'the Kitchen with a Smile.'"

At a meeting at the St. Pancras Town Hall on 24th June, the shield and certificates were presented to the winners by the deputy chairman of the Board, Mr. E. A. Mills, M.I.E.E., M.I.C.E., M.I.Mech.E. The judges gave a review of the display, emphasizing the points on which marks had been awarded and answered questions submitted by members of the staff.

Electronics Exhibition

The seventh annual exhibition of electronic equipment to be organized by the North-Western Branch of the Institution of Electronics which is to be held at the College of Technology, Manchester, from 15th to 18th July, is being organized on more ambitious lines than previously so as to admit items from more than 40 exhibitors. An extensive programme of lectures has also been arranged by the exhibitors relative to their products and there will be film shows on subjects ranging from the principles of electronics to television, the electron microscope and atomic physics. Exhibition catalogues (price 1s 3½d post free) and admission tickets and lecture programmes and tickets (by forwarding a stamped and addressed envelope) are available from Mr. W. Birtwistle, 17, Blackwater Street, Rochdale, Lancs.

Workers Dismissed

Because of redundancy about 350 workers, part-time and full-time, have been dismissed from the Cambridge factory of Pye, Ltd., during the past month. Most of them have been told that they will be reinstated as soon as possible.

Four hundred and fifty of the workers at the Cambuslang factory of Hoover (Electric Motors), Ltd., have been paid off.

"Mazda" Window Display

The latest "Mazda" window display at Crown House, Aldwych, is proving a great attraction. It portrays the theme "At night imagination's stronger . . . But 'Mazda' lamps stay brighter longer." The window space is converted into an old-fashioned and haunted bedroom, complete with disappearing and re-appearing "ghosts."

Novel lamp display at Crown House, Aldwych

Battery Orders

The Alton Battery Co., Ltd., has recently secured contracts covering two batteries each for Carlisle, Northampton, Norwich and Taunton telephone repeater stations, two batteries for Littlebrook "C" power station and for Carmarthen Bay power station, and one battery for Staythorpe "B" power station. The capacities of these batteries range from 400 to 6,900 Ah.

Foster Transformers

The name of Foster Transformers & Switchgear, Ltd., one of the Lancashire Dynamo group of companies has been changed to Foster Transformers, Ltd. This development follows upon the transfer of switchgear manufacture to Bridgwater, Somerset, some twelve months ago and the formation there of a new company—Lancashire Dynamo Switchgear, Ltd. Fosters will continue to manufacture transformers, test equipment and voltage regulators.

Houses for Workers

Pudsey Corporation has agreed in principle to erect 32 houses for the English Electric Co., Ltd., Thornbury, Bradford, for the housing of "imported" workers. It is proposed to build the houses on land fronting Daleside Road, and that the company shall pay £13 a year for each house and £500 towards the additional costs for drainage, etc.

Hire of Contractors' Plant

The Minister of Works was asked by Mr. I. M. Horobin in the House of Commons on 24th June whether he had completed his review of the statutory control of the rates of hire of building and civil engineering plant. Mr. Eccles replied that on the basis of an assurance given by the trade association concerned he had decided to remove the control as from 1st August and would shortly make an Order giving effect to this decision. The present maximum rates laid down in the Order would have had to be raised to cover increased costs of repairs, maintenance, overhauls and depreciation, and the trade association had said that it would recommend its members not to charge rates in excess of amended figures incorporating only certain actual

increased costs and to maintain those rates during 1952 unless there are further increases in costs.

Materials Handling Convention

On Friday last the Owen organization held a materials handling convention at its Whitegate factory, Wrexham. Sponsored by two of its constituent companies, Conveyancer Fork Trucks, Ltd., and Rubery Owen & Co., Ltd., it included an inspection of manufacture of fork trucks and pallets with demonstrations of applications, an exhibition of products of the organization, and papers and a brains trust on various aspects of mechanical handling. A film entitled "Fork Lightening" was also shown.

Aids to Market Gardening

The exhibit of the British Electrical Development Association at the "Britain Can Grow It" Exhibition at Reading last week covered both horticultural and domestic appliances. The horticultural section illustrated soil warming by low voltage equipment; propagation; soil sterilization; warm water treatment for bulbs, etc.; light irradiation for tomato seedlings; water supplies for domestic and commercial use; space heating; ventilation of commercial houses; pest control for horticulture; and a miscellaneous section which included wiring systems, control equipment and hedge cutters.

Power Plant in Australia

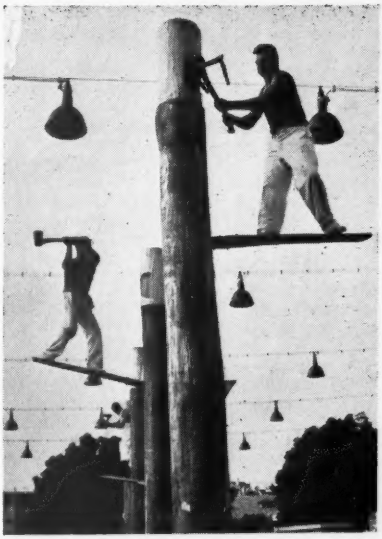
To ascertain whether Australian manufacturers could make their prices more competitive with overseas suppliers, the Sydney County Council has deferred acceptance of tenders for 225 sets of high voltage electrical equipment.

The Melbourne correspondent of the *Financial Times* says that the lowest British tender for supplying this equipment (£160,071) was submitted by A. Reyrolle & Co., Ltd.

The lowest Australian tender was by the Australian General Electric Company for £237,145, a disparity of 48 per cent. In 1948, when similar tenders were called for, Australian tenders were 19·8 per cent higher than those for overseas equipment. In 1950, the difference had increased to 31 per cent. The British tenders allowed for freight charges and the difference in the exchange rate.

Unusual Lighting Installation

Among the events which attracted great interest at the 1952 Royal Agricultural Show in Sydney, Australia, were tree-felling and wood chopping competitions. In the former, the competitors have to balance precariously on a narrow strip of planking representing the branch of a tree. This year a number of events, including the "wood chop" competition,



Benjamin lighting fittings installed at the Royal Agricultural Show, Sydney

were lighted for night work for the first time. The photograph (a daylight one) shows the new Benjamin deep bowl dispersive reflectors manufactured specially to meet the regulations applying in Australia. Those seen are the 18in type with heavy duty "Saaflux" tops, and were supplied by the Sydney branch of Siemens Bros., London. These new Benjamin reflectors are made from heavy gauge sheet steel and finished with "Crysteel" vitreous enamel green outside and white inside, which provides a very hard porcelain finish highly resistant to all atmospheres.

Change of Name

Stevenage Switches, Ltd., has changed its name to Stevenage Tools and Switches, Ltd.

Brush Aboe Orders

The Brush Aboe group of companies has received from the Australian Government an order for equipment worth more than £A500,000. The order, received through the group's Australian company, British Oil Engines (Australasia) Pty., Ltd., and placed by the Australian Department of Works and Housing, is for diesel engines and electrical equipment for defence projects. Included in the order are seventeen 12-cylinder turbo-charged V-form diesel engines of 1,140 b.h.p. at 750 r.p.m. to be supplied by Mirrlees, Bickerton & Day, Ltd. These engines are coupled to alternators giving an output of 780 kW, to be supplied by the Brush Electrical Engineering Co., Ltd., together

with Brush switchgear and other accessories. The equipment will be installed by the group's own engineers.

Orders received by the National Gas & Oil Engine Co., Ltd., of Ashton-under-Lyne, include 41 diesel engines for railway applications. Thirty-two of these are for use on New Zealand Government Railways.

Annual Holidays

Keith Blackman, Ltd., announce that their Arbroath works will be closed for the summer holidays from 18th July to 4th August, and the Tottenham works from 8th to 25th August.

The offices and works of Aeronautical & General Instruments, Ltd., Purley Way, Croydon, will be closed for the annual holidays from 19th July to 4th August.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £157 0s 0d
COPPER, H.C. Electro	ton £281 0s 0d
Fire Refined 99·70 per cent ..	ton £278 10s 0d
Fire Refined 99·50 per cent ..	ton £278 0s 0d
COPPER Tubes	lb 2s 8d
Sheet	ton £335 0s 0d
H.C. wire and strip	ton £313 10s 0d
LEAD, English	ton £134 10s 0d
Foreign	ton £133 0s 0d
MERCURY	flask £73 10s 0d
TIN	ton £969 0s 0d
ZINC, G.O.B. Foreign	ton £130 0s 0d
Electrolytic	ton £134 0s 0d
BRASS Tubes	lb 2s 3¼d
Sheet	lb 2s 6¾d
Wire	lb 2s 9¼d
PHOSPHOR BRONZE	
Wire	lb 3s 8¼d
RUBBER, No. 1 R.S.S. spot ..	lb 27½–27¾d

Tungsten Ore Price Reduced

The Ministry of Materials announces that, from 26th June, its selling price for tungsten ore of standard 65 per cent grade and ordinary quality has been reduced from 500s to 467s 6d per long ton unit delivered to consumers' works, based on the current buying price of 445s per long ton unit c.i.f.

Further Lead Price Increase

Following the increase of £4 a ton in the price of lead on 24th June, the Ministry of Materials announced a further similar increase the following day, raising the price to £137 a ton.

Copper Supplies

In its statement on copper prices dated 19th June the Ministry of Materials promised a further announcement on the conditions under which forward sales would be allowed for August, 1952. It is now announced that there will be no change in the usual arrangement whereby consumers may buy up to their full quotas of copper for the current month and also for the immediately following month.

Aluminium Price Increase

The Ministry of Materials announces that from 1st July the price of virgin aluminium in ingot form has been increased from £154 to £157 per long ton delivered into consumers' works. For metal in notch bar form there will be an addition of £2 10s a ton as at present. The new price will apply to metal of a purity of 99 per cent to 99·5 per cent inclusive. The premiums to be paid for higher purity ingots will be increased to the following:—Purity, minimum 99·6 per cent, £2 2s; minimum 99·7 per cent, £4 4s; minimum 99·8 per cent, £8 8s. The change in price is due to the further appreciation of the Canadian dollar.

Trade Announcements

Gillott Electro-Steam Cookers, Ltd., Chalford, Glos, have appointed Mr. D. D. Slaney of 30, Haselor Road, Sutton Coldfield, Warwicks (telephone : Sutton Coldfield 1417) to represent the company as sales and technical representative in the Midlands area and Mr. Frank Hampton, of 35, Adversane Road, Worthing, Sussex (telephone : Worthing 5400) as sales and technical representative for Kent, Sussex and the Southern area. Mr. J. D. Robertson, of 24, Birch Grove, W. Acton, London, W.3 (telephone : Acorn 7459) will in future confine his activities to the London area.

The London branch stores of **British Insulated Callender's Cables, Ltd.**, is now at 10-14, White Lion Street, Islington, N.1. (telephone : Terminus 8696-7). The branch office remains at 21, Bloomsbury Street, W.C.1.

As and from the 7th July, the London sales office of the **Electrical Apparatus Co., Ltd.**, will be transferred to 199a, Victoria Street, S.W.1 (telephone : Tate Gallery 8264/5).

The Plant Department of the **Metropolitan-Vickers Electrical Co., Ltd.**, has removed to 12, Hospital Street, Birmingham, 19 (telephone : Central 2801).

Catalogues and Lists

The Edison Swan Electric Co., Ltd., 115, Charing Cross Road, London, W.C.2.—Illustrated catalogue giving details of Ediswan "Ensur-a-lite" emergency lighting equipment (A.B.1568).

Quasi-Arc Co., Ltd., Bilston, Staffs.—16-page brochure describing the "Twin-Arc" welding process (T.C.854).

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Illustrated priced catalogue of lighting fittings and cold cathode fluorescent tubes (OS.596).

PARLIAMENTARY NEWS

From Our Special Reporter

THE Royal Assent has been given to the Electricity Supply (Meters) Act.

The North Wales Hydro-Electric Power Bill has been read the third time in the Commons.

Radio Apparatus Sales

Mr. W. T. Williams asked the President of the Board of Trade to what extent sales of radio and television had dropped during March to May over the preceding three months.

Mr. Peter Thorneycroft said that no separate figures were available of retail sales of radio and television sets, but he would give figures of manufacturers' deliveries. These showed that, in the three months February to April of this year, deliveries of radio sets to the home market fell by 21 per cent compared with the preceding three months, and that the comparable reduction in all deliveries of television sets was 4 per cent.

New Television Transmitters

Mr. Grey asked the Assistant Postmaster General where it was proposed to erect the two new television transmitters ordered by the B.B.C.

Mr. Gammans said he was informed that one of the transmitters would be erected at Sutton Coldfield and the destination of the other had not yet been decided.

Interference Caused by Television Sets

Replying to Mr. K. Thompson, Mr. Gammans said that some television receivers, when in use, unfortunately did cause interference with nearby sound receivers. Complaints of such interference in 1951 affected about one in every 300 television sets. He understood that manufacturers had already modified their designs to reduce this interference and that they were continuing their research with the object of making further improvement.

Metal Stocks

In reply to a question by Mr. Donnelly, the Secretary for Overseas Trade (Mr. Mackeson) circulated figures showing stocks of various commodities at 1st November, 1951, and 1st May last. They included the following (in thousand tons); copper, 116 and 110; lead, 47 and 116; and zinc, 36 and 65.

Hydro-Electric Development

Mr. Braine asked the Secretary of State for the Colonies whether he was aware of the need for hydro-electric development in Dominica; and whether, in view of the costly mistakes made by the Colonial Development Corporation in its hydro-electric scheme and the anxiety caused thereby in the Colony, he would consider whether other methods of providing and maintaining a supply ought to be adopted.

Mr. Lyttelton said that the Governor informed him that, although delay had occurred in the construction of the Colonial Development Corporation plant, the work was now proceeding smoothly. He did not consider that there was any case for adopting other methods of supply.

District Heating Schemes

During the discussion of the Essex County Council Bill Sir Herbert Williams moved to omit that part which dealt with the Dagenham district heating scheme. He felt that a very exhaustive technical examination was needed to discover whether such schemes were economic in the widest possible sense. They involved considerable capital expenditure which might be better spent on other things; they also involved a very large consumption of fuel. He neither condemned nor praised, but he did ask that all the facts should be examined before a decision was reached.

Mr. Erroll, who seconded the amendment, said that, superficially, district heating had many attractions, especially in a densely populated country such as ours. One had only to look at the immense amount of waste heat from power stations to bewail the loss of so many thermal units and to think what a pity it was that all that hot water was going down the river when it could be used to heat homes. He understood that the highly specialized example of Pimlico was economically worth while and that the scheme was proving a moderate success. What was superficially attractive, however, was not necessarily economically sound.

Mr. Parker agreed that there was a strong case for inquiry, but did not think that the Dagenham scheme should be held up meanwhile. He felt that this experiment would provide much cleaner houses for everybody. Under the scheme, 416 Borough Council houses were already supplied with heat in this way, and 63 L.C.C. houses were connected up.

Mr. Nabarro said that in Denmark, over a period of years, they had demonstrated that power and heat services for industrial purposes and domestic heating and hot water services could be provided at relatively low figures.

Replying to this and further debate, Mr. Marples, Parliamentary Secretary to the Ministry of Housing and Local Government, recalled that in 1946 Sir Ernest Simon, as he then was, issued a report of district heating and advised that an inter-Departmental Committee

on central heating should be set up, with a sub-committee to pay special attention to the possibility of district heating in this country. So far, the sub-committee had not submitted a report on a scheme, but it had in draft a memorandum on experience so far gained which it would shortly submit to the main committee. He suggested that the matter should be left to the Minister to consider because when it was submitted the report would be based on actual evidence and no really useful purpose could be served until that report had been analysed. It was very difficult to generalize on these schemes because every scheme varied in some degree from the other. One element was the saving of fuel. A thermo-electric scheme was more likely to save fuel than other schemes.

The amendment was, by leave, withdrawn and the Bill read the third time.

Telephone Developments

During a debate in the House of Lords on developments in the telephone service, Lord Sempill said that technological advance had been made in recent years of which we had not taken advantage. The electro-mechanical system in use to-day, provided jointly by concerns in America and in our own country, was obsolescent. What would replace them? The answer was the electronic exchange, which was scientifically related to the "electronic brain" or computer. It was a great British development of which they could justly be proud, and he begged the Postmaster General to see whether he could arrange to have one set up and to move quickly in the matter.

Earl De La Warr, in reply, said that his advice was that these electronic exchanges were some way ahead. There was no question of the scientists and experts being held back by the Postmaster General. It was the other way round; the Postmaster General, who did not understand the technical difficulties, was continually bothering the experts as to when they were likely to be ready to proceed. Quite naturally, they said that they needed more information than was at present available. We were in no way behind other countries in this development. Not only was there a small model of an electronic exchange at Dollis Hill, but at the moment there was in operation at the Richmond exchange a number of directors for steering calls to the exchange required. But that was on a very small scale, and he was reluctantly convinced that they could not go faster than they were going.

On other developments, he mentioned that with coaxial cable repeaters they had been able to take up to 600 conversations on one cable. It was hoped in the near future to increase that number to 900. This device had immensely reduced costs. They had made considerable development in the direction of radio relay links where no ducts or cables existed, and the television network might be not a competitor but a help to them in working along those lines. They were also developing long-distance dialling for trunk purposes by operators, and those in London and all the main provincial trunk centres were now able to dial into houses, say, from London to Manchester or from Cardiff to Liverpool. There was no real technical reason why subscribers should not dial trunk numbers from their own houses to other people's houses. It would, however, mean immense engineering work and equipment.

Referring to the telephone waiting list of 480,000, he said it was about 50,000 less than last year, but new demands were being made all the time. It was hoped to get the annual figure of new installations up to 150,000. There were to-day 2,000,000 more telephones than before the war.

National Coal Resources

Mr. T. Price asked the Minister of Fuel and Power if he would make a statement on the steps being taken by his department to utilize more effectively the nation's coal resources—with particular reference to inefficient stoking of industrial plants, failure to harness exhaust steam to the electrical grid, and bad siting of power stations.

In the course of his reply Mr. Geoffrey Lloyd said that the British Electricity Authority and the National Coal Board were now experimenting with pithead generation to utilize coal which would not otherwise be usable, and the construction of the super grid would make it possible to generate at the coal fields a much larger proportion than at present of the electricity now consumed in South-East England.

It was the policy of the Government and of the B.E.A. to encourage the development of joint steam and electricity production where it was likely to be economically justified and technically feasible. No satisfactory way, however, had yet been found of producing electricity as abundantly and as efficiently as the large power station did without at the same time wasting the heat from the condensers.

A Gloucester Building Licence

Mr. Nabarro asked the Ministry of Fuel and Power whether he would state the amount of the building licence granted to the Midlands Electricity Board in respect of the Gloucester City Electricity Centre which was officially opened on 5th November, 1951; and what steps he had taken to ensure that no excess expenditure occurred. Mr. Lloyd said that £15,000 was authorized in August, 1949, and he was informed by the Board that it completed the work in October, 1951, at a total cost of £17,143 and that the excess was due to the rise in the price of materials and unexpected difficulties with regard to the foundations. He was having the facts examined.

IN THE COURTS

Hove Corporation to Pay Surplus Funds to B.E.A.

THE first case of its kind under section 15 (3) of the Electricity Act, 1947, the result of which affects several outstanding cases, was decided by the Court of Appeal on 25th June. It concerned an application by the Hove Corporation to quash a decision of the Minister of Housing and Local Government that a sum of £17,520 9s 3d, held by them in their general rate fund immediately prior to vesting day, constituted the net surplus funds of the electricity undertaking and was therefore payable, in accordance with sections 14 (1), 14 (2) (iii) and 15 (1) of the 1947 Act, to the British Electricity Authority.

This decision of the Minister was made in October, 1951, on the application of the Authority by virtue of section 15 (3) of the Act. The Corporation objected to the finding and applied to the Queen's Bench Divisional Court for an Order of *certiorari* to quash the decision on the ground that there was " an error of law on the face of the record," and that the money was held by the Corporation in its capacity as a local authority. The application was refused by that Court and the Corporation appealed.

Lord Justice Singleton said in his judgment in the Court of Appeal that the powers of the Corporation as authorized electricity undertakers were given by the Hove Corporation Act, 1913. That Act incorporated the Schedule to the Electric Lighting (Clauses) Act, 1899, and was not affected in that regard by the Hove Corporation Act of 1947. Section 7 of the Schedule, as amended by section 43 and the 5th Schedule of the Electricity (Supply) Act, 1926, limited the application by a local authority of the net surplus funds of its electricity undertaking to four prescribed objects, three of which were for the benefit of the undertaking. The fourth was to aid the local rates, but any sum so applied could not exceed 1½ per cent of the undertaking's outstanding debt.

Section 185 (1) of the Local Government Act, 1933, provides that all the income of a local authority shall be paid into the general rate fund, but section 194 expressly prevents such an authority applying " the surplus revenue of any undertaking carried on by them otherwise than in accordance with the provisions of any enactment or statutory order relating to that undertaking."

It followed (his Lordship said) that, though the net surplus funds of this electricity undertaking were paid into the general rate fund of the Corporation, they retained their identity until specifically applied in accordance with section 7 of the amended Schedule to the 1899 Act. The accounts of the Corporation showed that contributions in aid of the local rates amounted to £2,205 in the final year before vesting, and to £2,307 in the previous year. These sums were, in fact, equal to 1½ per cent of the outstanding mortgage debt of the undertaking for each of those years; thus, the remaining surplus, the sum claimed by the Authority, was held by the Corporation as authorized undertakers.

The Minister's decision was right and there was no error of law. The application would be dismissed, and costs incurred by the Authority and the Minister would be borne by the Corporation. Leave to appeal to the House of Lords was refused.

National Fuel Policy

THE Institution of Incorporated Plant Engineers has submitted to the Ridley Committee evidence on the importance of a co-ordinated National Fuel Policy. The members of the Institution are professional engineers responsible for the installation, running and maintenance of heat- and power-using plant in privately-owned and publicly-owned industry and in Government-controlled establishments. They claim, therefore, that their views are those of the actual industrial consumer of fuel.

Among the suggestions made are that taxation relief is needed if industry is to install capital equipment for fuel efficiency purposes; that boilerhouse operatives must be certificated and paid as craftsmen; and that consulting engineering services, on a national basis, should be made available to industry by absorbing and expanding existing bodies including the Fuel Efficiency Branch of the Ministry of Fuel and Power.

Industry should receive supplies of electricity and gas at a fair price and without interruption. The price competition between these services for the domestic market and the sale of gas and electricity to the domestic consumer at an unrealistic price is condemned. The energies of the British Electricity Authority should be turned away from the domestic field to that of railway electrification where the use of electricity has vast economies to offer.

Because the need for efficiency in fuel and power spreads through every field of national activity, it is believed that a National Fuel Policy cannot be implemented by any existing authority and the report recommends the establishment, under the Minister of Fuel and Power, of a National Fuel Trust.

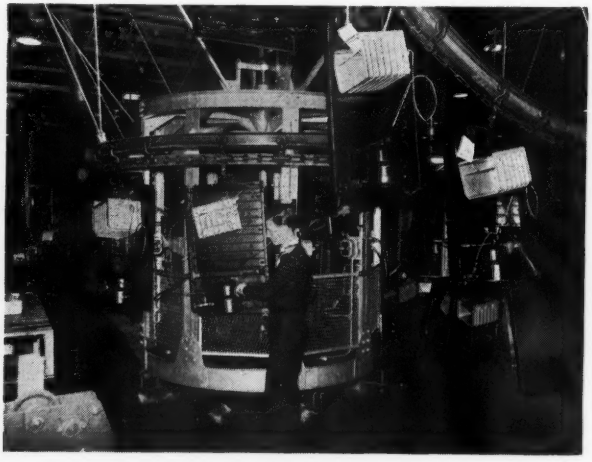
Sealed Refrigeration Units

Production at a Crewe Factory

HITHERTO imported from the United States, the "Polarsphere" sealed units incorporated in Kelvinator refrigerators are now being produced completely at the Kelvinator factory at Crewe. At present they are being made in three sizes: $\frac{1}{8}$ h.p., $\frac{1}{5}$ h.p. and $\frac{1}{4}$ h.p. for many domestic and commercial models.

What impressed us most during a recent inspection of the manufacturing arrangements were first the high degree of accuracy demanded in the machinery and secondly the smooth operation of the flow production methods depending to a considerable extent on the use of a continuous conveyor system 1,000ft in length. The design of the unit, which does not provide for the use of piston rings, calls for extreme accuracy and the machine operators work throughout to one ten-thousandth part of an inch or better.

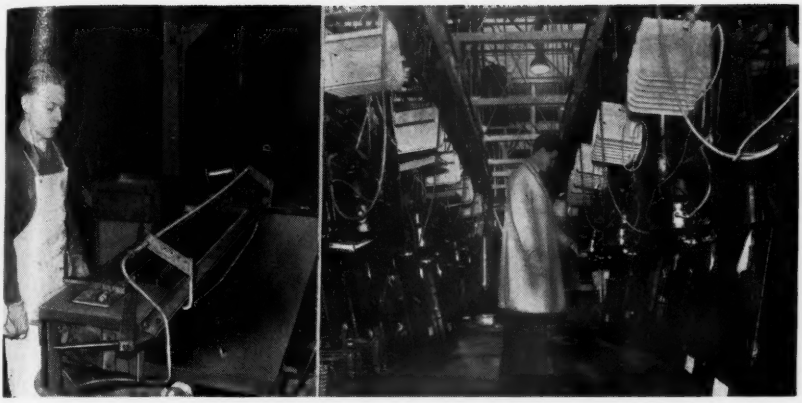
All of the cylinders, pistons, gudgeon pins and connecting rods are graded into code sizes in 0·0001in steps



Above Left: **Compressor assembly room showing units receiving their voltage test**

Above Right: **Induction heaters are employed in shell assembly**

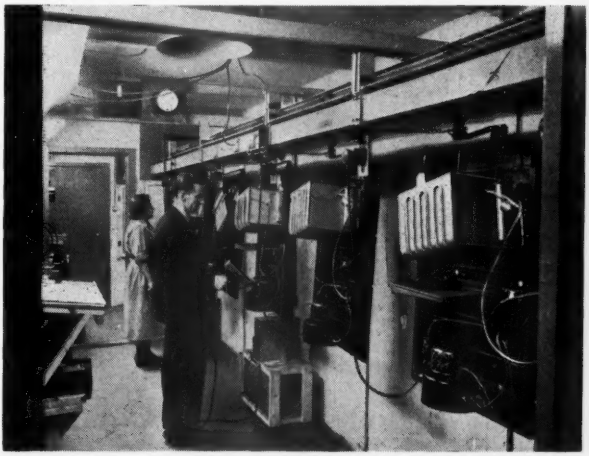
Left: **One of the carousels where the refrigeration units are evacuated**



and selective fitting is adopted in each case. The total out-of-roundness permitted for the piston is 0·0001 in, while the gudgeon pin hole must be square to the cylindrical surface of the cylinder within extremely close limits. The care taken in securing this high degree of accuracy is reflected both in the high efficiency and the silent operation of the units and enables a five year guarantee to be given with confidence.

All raw materials and bought-out components including the rotor and stator units are inspected before issue to the appropriate points in the production lines. Parallel rows of automatic and semi-automatic capstans, multiple head borers, drilling and boring machines, etc., produce the stator housings, cover plates, pistons, crankshafts, connecting rods, etc., the finished components being micrometer tested, inspected and degreased before passing into the assembly department. Here the valve plates are first assembled and tested, while the pistons, connecting rods and gudgeon pins are selectively fitted to one another, retaining clips keeping the pins in position.

Meanwhile the shells of the sealed units are machined and assembled on another production line, a 200 kVA Sciaky projection welding set being employed to attach the mounting brackets, terminal bushes and compressor connections with a Cycarc stud welder attending to the mounting studs. Delapena "Deltron" equipment is used for brazing the cylinder head and tube assembly. During this operation and also during the welding of the compressor connections gas is passed through the tubes



Above Left: **Resistance soldering is a feature of the capillary and suction lines**

Above Right: **A section of the sealed compressor conveyor assembly system**

Right: **Silent test room for checking silence of operation**

to prevent the formation of scale. Also, to keep the fluid from entering the cylinder head and tube assembly during the washing operation which follows the brazing, a pressure of about 25 lb/sq in is maintained inside the system. An interesting feature of the capillary and suction line assembly is the use of a resistance soldering device developed by a member of the company's staff. Operating with a pressure of 12 V across the terminals, it considerably reduces the time taken to solder the two tubes together, during which time, as a pre-dehydration process, dry air is blown through the tubes.

Air conditioning has been adopted in the sealed compressor assembly room where the cylinder blocks are mated with the pistons and where the stators and rotors are in one operation pressed respectively into the housings and on to the crankshafts, the air gap between the stator and rotors being checked to be between 0·008in and 0·012in. After attaching dummy flush plates the terminal connections are made and the wattage is checked with the units under vacuum. High voltage insulation and sound tests are also carried out at this stage.

Leaving the sealed compressor assembly room, the units pass into the arc welding shop where the joints between the shells and the end plate are sealed. Pressure tests in water follow at 200 lb/sq in, which is well above the normal operating pressure of 125 lb/sq in, and the compressors are then dip painted before receiving their first dehydration at 250 deg F under a 28in vacuum.

Arriving at the loading point of the continuous conveyor circuit already referred to, the compressor, evaporator and section lines are mounted on a backplate to form a "stack" or vertically arranged assembly of remarkably small size which permits the maximum utilization of cabinet space. At this stage the unit is completely sealed except for the charging valve.

Whilst loaded on the conveyor the units are charged with dry air and are then passed through a hot water defluxing tank and a spray wash before undergoing a leak test in glass-sided inspection tanks filled with water. Dried off in an oven, they then pass through a paint dipping tank. On the first carousel they are evacuated to 500 microns, and proceed to a balancing out oven; they are again evacuated as they pass round the second carousel.

Final testing of a commercial refrigerator

The units are then charged with refrigerant (Arcton 6) and continue on to an electrified section of the conveyor where they are "run in" and examined for refrigeration performance before entering a room where they are tested for quietness of operation. Further checks for electrical efficiency and safety, leaks, etc., are a matter of routine. Having now completed the circuit of the conveyor, the units are ready for installation in their cabinets, after which they receive yet another running test before being packed for sale.

A very high proportion of the output of the company's products is at present reserved for export, as much as 85 per cent in value in the case of domestic models.

Batti-Wallahs' Society

GREAT Britain's prospects in the Olympic Games in Helsinki this month formed the subject of an address by Mr. Harold Abrahams at the Batti-Wallahs' monthly luncheon on 25th June. Our team, he said, was the best ever sent to the Games and 50 per cent of the British competitors would on their best performances have won their events at the last Olympics. Mr. Abrahams was thanked for his address by Mr. A. N. East. Mr. J. W. Perkins presided.

At the next luncheon on 30th July Sir Patrick Hannon will be the guest.

ELECTRICITY SUPPLY

Large B.E.A. Contracts

Progress at Bankside

CONTRACTS for equipment for power stations amounting in the aggregate to £9,290,000 have been placed by the British Electricity Authority during the past month. The principal contracts include the following:—

Brunswick Wharf: One 60 MW turbo-generator, condensing and feed heating plants, transformers, etc.—Metropolitan-Vickers Co., Ltd.

Hackney: 6·6 kV switchgear.—General Electric Co., Ltd.

Woolwich: One 30 MW turbo-generator.—General Electric Co., Ltd. Condensing and feed heating plant.—Worthington-Simpson, Ltd.

Marchwood, near Southampton: Two 60 MW turbo-generators.—British Thomson-Houston Co. Ltd.

East Yelland, near Barnstaple: Two 180,000 lb/hr boilers.—John Thompson Water Tube Boilers.

Goldington, Bedford: Structural steelwork.—J. Booth & Sons (Bolton), Ltd. Two 300,000 lb/hr boilers.—Clarke Chapman & Co., Ltd. Two 30 MW turbo-generators.—B.T.H. Co. Condensing and feed heating plants.—G. & J. Weir, Ltd.

Brimsdown, near Enfield: Foundation and building works—third extension.—Walter Lawrence & Son.

Hams Hall "C," Birmingham: Three 60 MW turbo-generators.—G.E.C.

Ince, near Ellesmere Port: One 60 MW turbo-generator.—G.E.C. Condensing and feed heating plant.—Hick, Hargreaves & Co., Ltd.

Blackburn: Building and iron store and workshops.—Holst & Co., Ltd.

Rotherham: High pressure pipework.—Stewarts & Lloyds, Ltd.

Keadby, near Scunthorpe: Two 550,000 lb/hr boilers.—Stirling Boiler Co.

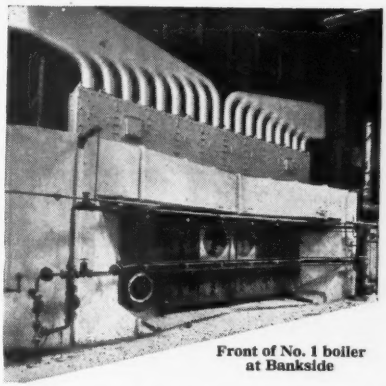
Stella North, near Newcastle-upon-Tyne: Coal handling plant.—Birtley & Co., Ltd.

Stella South: Low pressure piping equipment.—Aiton & Co., Ltd.

Huncoat, Accrington: Two 30 MW turbo-generators and generator transformers.—General Electric Co., Ltd. Main auxiliary and control cables and connections.—W. T. Glover & Co., Ltd.

Bankside Fuel

The new Bankside power station, the first half of which containing two 60 MW units is nearing completion, is the first British station to be designed solely for oil firing. The accompanying photograph shows the exterior arrangements for feeding fuel oil to one of the four Foster Wheeler boilers (one spare) serving the initial installation. Each boiler has normal economic and maximum continuous ratings of 300,000 and 375,000 lb/hr with corresponding efficiencies of 86·5 and 85·9 per cent. Steam conditions are 950 lb/sq in and 925 deg F. Heavy residual oil (equivalent to Bunker Grade C) having a calorific value of 18,250 B.Th.U./lb and a specific gravity of 0·98, is supplied to twelve burners of the mechanical atomization type in each boiler at 350 lb/sq in and 270 deg F. Its high viscosity (6,000 sec Redwood No. 1 at 100 deg F) necessitates steam-heating to 110 deg F for preliminary handling. Fuel oil consumption for the completed 240 MW station will be 230,000 tons annually with two-shift working for an output of 785 million kWh (sent out) at 28.4 per cent thermal efficiency.



Front of No. 1 boiler at Bankside

Glen Affric Scheme Inauguration

The Duke of Edinburgh is to open the Glen Affric hydro-electric scheme in Inverness-shire on 13th October.

Scottish Transmission Lines

A scheme prepared by the North of Scotland Hydro-Electric Board for the transmission of electricity from the transforming station which is to be erected at Fort Augustus to a point in Glen Truim on the existing main transmission lines between Tummel and Keith has been confirmed by the Secretary of State for Scotland. The scheme will reinforce the Board's grid and will transmit to the grid the electricity which will be produced by the Garry and Moriston generating stations. It is estimated to cost £450,000. The Amenity Committee recommended adjustments in the proposed route

A view of the new building adjacent to the Bankside power station (taken from the station) to which the engineering staff of the British Electricity Authority is moving shortly

through the Corrieyairack Pass so as to keep the line farther away from General Wade's road, and a minor adjustment to avoid woodland near the Glen Truim end of the line. The Board accepted the recommendations.

Electricity for Donside

It was intimated at a meeting of Aberdeenshire General Purposes Committee on 20th June that the North of Scotland Hydro-Electric Board hopes to make a start on a restricted scheme to supply electricity to consumers between the Brig o'Feugh and Strachan. This follows an approach to the Electricity Consultative Council by the County Council.

Farmers and Overhead Lines

It is reported that farmers whose land will be affected by the decision to construct a 275 kV line from Carlisle to Stella (Newcastle-on-Tyne) are continuing their opposition to the scheme, and many of them have decided to refuse wayleaves for the lines to cross their land. The route of the lines has been approved by the Ministry of Fuel and Power, but farmers are insisting that the lines could be carried over land less valuable to agriculture.

Change-over in North-East

The North Eastern Electricity Board has applied to the Ministry of Fuel and Power for permission to alter existing d.c. and non-standard a.c. supplies to the standard system. The change will be made gradually as circumstances permit.

Durham Schemes Approved

Durham County Planning Authority has approved the following proposals by the North Eastern Electricity Board:—Erection of 11 kV line between Darlington and Dinsdale in connection with h.v. reinforcement of Dinsdale area; erection of 20 kV line and pole-mounted substation, l.v. overhead line and reconstruction of existing l.v. network to reinforce Ferryhill network; erection of l.v. overhead line and reconstruction of existing l.v. overhead lines at Great Usworth; erection of 20 kV line at Tudhoe; l.v. overhead line and reconstruction of existing l.v. overhead network at Littleburn, Langley Moor, New Seaham, East Kyo, Crookgate, and New Kyo. Proposals submitted by the British Electricity Authority and also approved included a 132 kV switching substation forming part of the Stella South power station; erection of 132 kV interconnectors at Stella power station and erection of 132 kV lines Stella to Norton and Stella to Dunston.

French Hydro-Electric Scheme

The French Minister of Industry, M. Louvel, last week officially opened a large hydro-electric station at Chastang on the Dordogne River in central France. It will produce 540 million kWh a year. The first of the three groups of turbines actually went into service last November. M. Louvel told an audience which included the deputy premier, M. Queuille, and high officials of Electricité de France, that the country's electricity needs were being met for the moment, but " it remains to satisfy increasing needs."

Rural Supplies

Glendale (Northumberland) R.D.C. has been informed that the South East Scotland Electricity Board is to spend £10,000 during the next few months on supplying electricity to the rural area. Recently strong representations for an electricity supply have been made by the local authority supported by the National Farmers' Union and others.

Tenants Prefer Electricity

Because of the cost, Lockerbie Town Council is to reconsider its electricity or gas free choice scheme in new houses. More than 80 per cent of the tenants prefer electricity.

Engineering in Europe

Survey of Current Literature

THE construction of machinery of heavy overload capacity, say, induction motors, etc., compels designers to look for insulating materials able to withstand heavy thermal stresses, for which purpose any material containing a considerable amount of carbon is unsuitable. The class of insulants characterized by refractoriness, i.e. ceramics, glass, quartz, etc., has hitherto been out of the question for these uses because of their mechanical unsuitability, but the introduction of the glass fibre has changed the position, especially the type known as glass silk, which satisfies the dielectric, thermal and mechanical (i.e., tensile and wear strength) requirements. However, the winding-on process is still somewhat delicate, because the flexibility and mechanical strength of a glass fibre of normally 0·08–0·09 mm calibre cannot quite equal that of a textile material.

It was found that an impregnation with silicone varnish of very low viscosity imparts to the glass silk insulation all the characteristics required and leaves a wide margin for producing many varieties of wire insulations according to special requirements. Where a single layer of glass silk and impregnation is not found sufficient, a second layer may be wound or braided on, and the impregnating coat will ensure a smooth and wear-resisting surface, and, above all, will make it completely moisture-proof. More variations are obtainable by varying the hardening process (which should never be carried too far).—" Use of Silicone Varnishes for Impregnating Conductors Insulated with Glass Silk," H. Reuther and O. Grundmann, *Elektrotechnik*, Vol. 6, pp. 40–41, January, 1952, in German.

Series Capacitors

The series capacitor differs from the parallel capacitor, which is the conventional static solution of the compensation problem. Firstly, its reactive power depends on the current and therefore on the loading, and secondly, it permits of regulating the voltage at the consuming device according to the loading. These valuable characteristics are partially offset by the series capacitor's greater susceptibility to damage in cases of short-circuit or overloading. It is, therefore, only after careful planning and investigation of the normal operating conditions and possible fault conditions, determination of s.c. currents, surge voltages at the capacitor, etc., that the question whether or not series capacitors should be used in a given industrial system can be answered.

The conditions of operation of the circuit breakers on clearing short-circuits, the possible occurrence of sub-synchronous oscillations and ferro-resonance have also to be considered in this connection. Yet a number of very successful uses of series capacitors, mainly in industrial furnace circuits (highly inductive), welding plants and similar consuming devices show which special conditions call for series capacitors in preference to parallel capacitors and also make them the simplest and cheapest solution of the problem of compensation.

As a compensator of reactive power of motors the series capacitor is inferior to the parallel capacitor, because the reactive power produced by idling motors does not depend on the load current but on the mains voltage.—" The Series Capacitor in Industrial Plants," W. Kafka, *Siemens-Zeitschr.*, Vol. 26, pp. 62–68, No. 2, March, 1952, in German.

Wattmeter Phase Errors

Electrodynamic wattmeters could be calibrated by a d.c. potentiometer with an accuracy better than the adjustment error of the wattmeter itself; in the ideal case the reading of such a wattmeter should be equally correct for a.c. and d.c., but small errors are bound to occur in a.c. operation. These are due to: (a) the inductance of the moving voltage coil, (b) the capacitance of the series resistance in the moving-coil circuit, (c) the currents set up by the current field in secondary circuits, and (d) currents in secondary circuits set up by the field of the voltage coil. All these

disturbances produce a small phase shift δ between main current I and its field, or between the voltage applied, U, and the corresponding field of the moving coil. The error is, then, $F = UI \sin(\phi - \delta) \sin \delta$, and its maximum occurs at $\cos \phi = 0$. It is therefore best determined at $\cos \phi = 0$.

The author analyses the four disturbing components (a)–(d) and their relative effects in more detail and then suggests a measuring circuit for the phase error with air-cored inductance coils as 90 deg-standard, the circuit being essentially a potentiometer circuit. The primary current coil has many ampere-turns, in order to keep the inductance of the secondary coil low (and also its capacitance). The coupling between the coils is loose, so that the inter-coil capacitance is low. Secondary voltage, and thus measured voltage, is low in order to obtain low potentials against earth and to permit working with low resistances. The systematic error of the circuit elements is only 1×10^{-4}. Results of measurements at 50 c/s and 500 c/s are given for various wattmeters. The 500 c/s measuring circuit uses a phase-shifter and a resonance circuit for smoothing the wave form. The circuit could be modified for measurements at any $\cos \phi$.—" Measurement of the Phase Error of Wattmeters by a Mutual Inductance," H. E. Linck, *E.T.Z.*, Vol. 73, No. 6, pp. 155–158, 15th March, 1952, in German.

Supersonic Insulator Testing

The testing of ceramic insulators by this simple impulse-reflection method is very conveniently and rapidly carried out by means of a combined generator-receiver with calibrated c.r.o. and automatic recording camera. The location of defects in insulators is facilitated by the radar-type oscillograms from which the distances are directly read off. The deficiencies so detected are generally either of the cavity or of the porosity type and it is these which elude most other testing methods, especially where, as is often the case, only one half of the insulator is affected by them. The generator and receiver must have a satisfactory frequency range, and this is not the same as that used for similar " reflectoscopes " applied to steel and other metals. The resolving power rises with frequency and for fine-grained materials, such as china, the appropriate range is from 2·5 to 5 Mc/s.

It was found to be safest if the sounding test was made successively in two directions at right angles to each other and the sensitivity is such that microcracks of 10^{-5} mm thickness are detected without fail. With the Siemens-type " reflectoscope " about 1,000 insulators of the core and long-rod types can be tested daily. Where more detailed investigations are required, the measurement of sound absorption and sound velocity in the tested material is possible and yields valuable data for improvements and general control of the baking process.—" Non-destructive Testing of Ceramic Insulators by Supersonics," H. Barthelt and A. Lutsch, *Siemens-Zeitschr.*, Vol. 26, No. 3, pp. 114–121, April 1952, in German.

Earthing through Spark-gaps

A theoretical analysis, model tests and comprehensive statistics of lightning strokes upon earth wires confirm that earthing of overhead earth wires through spark-gaps does not impair the protective effect of the earth wires. The only condition to be satisfied is that the breakdown voltage of the insulation of the earth wire to earth must be low. It was found that a single insulator of the U.S.S.R. standard type P-4,5 satisfies this condition and prevents the breakdown of a spark-gap set to 40–50 mm. Settings of 25–30 mm are sufficient for extinguishing the follow-up arc at commercial frequency of a 220 kV line protected by earth wires of the comparatively great length of 8 km a section. (In the model tests, section lengths up to 16 km were simulated). The calculations were based on the well-known propagation rates of leader and main discharge and currents of the main discharge, and on an estimate of the leader current (which is not so well known). The experiments also yielded new data on the percentage of strokes upon the earth wire in relation to length of the protected section, on the modification of the orientating effect of the earth wire by the spark-gap, and effect of the latter on the distribution of strokes between line and earth wire.—" Earthing of Overhead Earth Wires through Spark Gaps," A. I. Dolginov, I. G. Smirnov, V. D. Yurenkov, *Elektrichestvo*, No. 4, pp. 3–9, 1952, in Russian.

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates.—Editors, *Electrical Review*.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Mains Signal Lamp

A LARGE mains voltage signal lamp fitting for use with either pygmy sign lamps or with indicator neon lamps with standard bayonet caps has been introduced by A. F. BULGIN & CO., LTD., Bye-Pass Road, Barking, Essex. It has a polished black moulded front bush and screw-on bezel with a black crackle finish, non-ferrous metal body and a moulded lampholder with shrouded terminals. The fitting is adequately louvred for ventilation and a complete range of coloured glass lenses is available. The overall dimensions are 2·822in by $4\frac{31}{32}$in while the front panel projection is $1\frac{15}{32}$in and the fixing hole required is about $2\frac{1}{4}$in. The price of this fitting is 25s without bulb.

Bulgin mains voltage signal lamp fitting

CO_2 Tester

We have received from the SHANDON SCIENTIFIC CO., 6, Cromwell Place, London, S.W.7, a brochure describing a simple and compact instrument, known as the "Fyrite," for testing the proportion of CO_2 in flue gases. It is claimed that tests can be carried out in 40 sec by unskilled persons, after only short instruction, with a deviation from complete accuracy of less than 0·5 per cent.

Dual-Voltage Shaver

The new dual-voltage a.c./d.c. de luxe shaver now being made by ARVIN ELECTRIC, LTD., Fernbrook Avenue, Southend-on-Sea, incorporates a built-in voltage selector permitting its use either on 100/130 V or 200/250 V. Packed in a presentation case, it costs £5 10s (including £1 1s 9d purchase tax in the United Kingdom).

Watertight Thermostat

Designed especially for use in damp situations, the "Evenwarmth" watertight thermostat (stem type) made by UNITY HEATING, LTD., Chilworth Manor, Southampton, is particularly suitable for controlling glasshouse air heating installations and for use in conjunction with electric soil warming equipment. Its wide temperature range (30–90 deg F) enables it to control soil temperatures for the special needs of germination, etc., within a differential of $\pm$ 1 deg F. The circuit is controlled by silver contacts operated by a bi-metallic strip. The unit is housed in a robust aluminium casing.

Replacement Wringer Gearbox

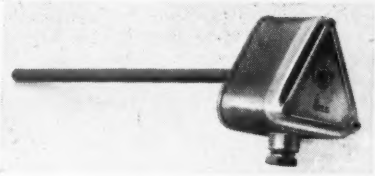
A wringer head gearbox to fit the pre-war American "Apex" washing machine is now being made by the APEX ELECTRICAL ENGINEERING CO., 116 & 118, Camp Road, Leeds, 7. The unit is substantially constructed in cast iron and much stronger than the original diecasting. It will fit the wringer post and engage with the drive bar exactly as the original and the wringer frame is attached to the box without any alteration being required. The price has been provisionally fixed at £12 10s. The company stresses that it has no official connection with the "Apex" machine, and that the similarity in name is coincidental.

L.v. Gripper Handlamp

A low voltage model of the "Gripper" handlamp range made by BRITISH CENTRAL ELECTRICAL CO., LTD., is identical with the mains units except that a robust, heavy duty type b.c. lampholder, 2 slot or 3 slot, is employed, suitable for 12 V 60 W lamps. The new lamp costs 5s 6d more than the normal type of handlamp, i.e., "Standard Gripper," "Super Gripper," etc. Transformers, both portable and permanent fixed types, can be supplied to accommodate one or many handlamps.

L.v. "Super Gripper" handlamp

Below: Unity watertight thermostat



London's Trams

Completion of Conversion Scheme

A CHAPTER in London's transport history will close next week-end with the abandonment of the six remaining tram routes. They are Nos. 36, 38, 40, 44, 46 and 72, from Abbey Wood, Plumstead and Woolwich to Eltham Green, Victoria Embankment, and Southwark. The last stage covers the withdrawal of 162 trams and the introduction of 114 oil-engined buses, making 737 trams withdrawn and 768 buses introduced under the South London conversion scheme. Before the war most of the tramways north of the Thames had been replaced by trolley-buses.

Horse trams first appeared in London in 1861 when an American, G. F. Train, opened the Marble Arch Street Railway, followed by the Westminster and the Surrey Side Street Railways, but because the rails protruded above the roadway Train was ordered to remove them. In 1870 trams again appeared in London and with the passing of the Tramways Act of that year there was a spate of new schemes.

Early Mechanical Operation

The first attempts at mechanization were made in the early 'seventies when L. Perkins' steam "tram-horse" and J. Grantham's steam-operated tramcar were tried out, while in 1877 experiments were made with compressed-air tractors. During the next few years experiments were conducted with battery locomotives and in 1883 the first self-contained electric tramcar, a battery-operated horse-car, saw service—for one day only—in West London. Clifton Robinson inaugurated his steam-operated cable tramway up Highgate Hill in 1884, and the late 'eighties saw regular services of steam and compressed-air trams in North London and electric battery cars along the Barking Road.

In the operation of regular electric tram services as we know them to-day London lagged behind the rest of the country. The London County Council, which had acquired many of the tram systems in its area, obtained electrification powers in 1900, but the capital's first electric system (designed by Clifton Robinson) was opened by London United Tramways in 1901. From 1903 onwards the L.C.C. electrified most of its tramways as well as extending them, the last horse-drawn tram being withdrawn in 1915. The problem of whether to install overhead wires, expensive conduits or potentially dangerous studs was resolved largely by adopting conduit systems for the inner districts and overhead wires elsewhere. The hitherto separate systems north and south of the Thames were linked with the building of the Kingsway Subway and in 1908 through services from Highbury to Kennington by way of Westminster Bridge were inaugurated.

After a quarter of a century's operation the L.C.C. tramways incurred their first deficit in 1920 and four years later the Council was exploring the possibilities of future development by way of "the rail-less tram and omnibus rather than the fixed-track tramway." In 1931 an attempt was made to regain lost ground with the introduction by the London United and Metropolitan Electric companies of a radically improved tramcar, but after 1932 no new trams were built to run on London's 700 miles of tramways which had cost £10 million to construct.

Post-War Change of Policy

The seventeen tramway undertakings in Greater London with their 2,600 cars and 327 route miles of tramways (including the L.C.C.'s 1,713 cars and 167 route miles) were taken over by the London Passenger Transport Board in 1933 and a decision was made to abandon them in favour of trolley-buses (the first trolley-bus service had been introduced by London United in 1931). By the outbreak of war nearly all the trams north of the Thames had been withdrawn. When, however, the work was resumed in 1950 it was decided to use oil buses instead of trolley-buses for the remainder of the scheme.

To mark the completion of the change-over souvenir tickets bearing reproductions of Train's Marble Arch tram and a double-deck electric tram have been issued during the past week.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Engineering Components, Ltd.—Mr. C. C. Griffith (chairman) stated at the annual meeting last week that production and sales during the year had broken all previous records, in spite of the raw material difficulties which progressively increased as the year went on. It was proposed to create a special reserve of £120,000 against a possible fall in stock-in-trade. Both direct and indirect export business had increased considerably and the company's subsidiary in Australia had also had a record year. While they were not able to estimate at present the effect of the latest Australian import restrictions, in view of the vital importance of transport, it would appear that some consideration must be given to the importation of raw materials necessary for the manufacture of components to keep the transport system going. Referring to the proposed Excess Profits Levy which he declared would stultify new enterprise and development, the chairman said that should the company's profits for the current year continue at the same rate as for 1951, it would have to face an additional tax charge of £80,000 to £100,000.

London Electric Wire Co. & Smiths, Ltd.—The hampering effect on the company's activities of building restrictions was referred to by Mr. W. J. Terry (chairman and managing director) at the annual meeting last week. He said that essential building operations had had to remain almost at a standstill throughout the year and in consequence the company had plant which could not be put into service. He added, however, that the company hoped soon to install a much-needed and up-to-date rolling mill at its northern undertaking. There had been some easement during the past few months in respect of supplies of some raw materials but copper, their principal raw commodity, was still much restricted. In their opinion the only way to stabilize prices on a world basis was to re-open the London Metal Exchange. Last year's trading constituted a record and the total reserves and unappropriated profits now amounted to £3,690,007, which was more than two and a half times the total issued capital.

Scottish Cables, Ltd., in the year ended 30th April made a trading profit of £311,278 (£274,561), to which was added investment income £15,920 (nil). Taxes took £178,795 (£143,700) and depreciation and auditors' remuneration £23,503 (£24,656), leaving £124,900 (£106,205). A final ordinary dividend of 22 per cent (20 per cent) makes 32 per cent on a capital of £291,667 (30 per cent on £250,000). General reserve receives £60,000 (£45,000) and £24,515 (£25,606) is carried forward. Subject to the consent of the Capital Issues Committee it is proposed to recommend a one-for-one scrip bonus.

W. & T. Avery, Ltd., are to pay a final dividend of 10 per cent, making 15 per cent on a capital increased in June last year from £854,178 to £1,708,356 by a free share bonus. In the previous year a total dividend of 25 per cent was paid on the old capital. The group profit for the year ended 31st March amounted to £706,470 (£611,694), of which £689,395 (£603,058) was attributable to the parent company. The carry-forward is increased from £243,840 to £258,935.

Telegraph Construction & Maintenance Co., Ltd.—In addition to the distribution (referred to last week) of 325,682 fully paid up ordinary £1 shares to shareholders in the proportion of one new share for every three held, the company is offering a further 651,364 ordinary £1 shares to shareholders at 21s 6d each in the proportion of two new shares for each three existing shares held. An interim dividend of 5 per cent (same) is announced.

Reliance-Clifton Cables & Industrial Products, Ltd., report an increase of £41,645 in the group trading profit, which amounted to £268,378 for the year ended 30th November. The consolidated net profit was £103,794 (£93,814). A final dividend of 17½ per cent again makes a total distribution of 30 per cent and general reserves receive £101,250 (£63,296), leaving £31,830 (£29,765) to be carried forward.

Johnson, Matthey & Co., Ltd., propose to pay a final ordinary dividend of 12 per cent, making 15 per cent for the year (same). The new ordinary shares which were issued last September rank for half the total distribution. The consolidated net profit for the year ended 31st March, after charging £782,244 (£771,245) taxation, amounted to £580,429 (£622,175).

Crompton Parkinson, Ltd.—The necessary consents having been obtained at class meetings of the "A" ordinary stockholders and ordinary stockholders, the scheme for the consolidation of the ordinary and "A" ordinary stocks and the payment of compensation to the existing ordinary stockholders is being carried out. The directors have accordingly allotted 75,000 ordinary shares of 5s each (converted into ordinary stock on

allotment) to holders of the issued 600,000 ordinary stock units in the proportion of one additional stock unit of 5s for every eight stock units held.

Scophony-Baird, Ltd., record a trading profit for the year ended 31st March amounting to £35,457, compared with a loss of £55,883 for the previous year. After writing off expenditure on development account and patents, trade marks, etc., and after placing £10,000 (nil) to general reserve, the net profit was £6,779 (loss £142,864). Again no dividend is to be paid.

Electrical Switchgear & Associated Manufacturers, Ltd., reports a consolidated profit for the year to 31st March last of £272,386, as compared with £171,682 for the preceding year, and after providing £165,615 for taxation, a net profit of £106,771 (against £76,661). The ordinary dividend absorbs £103,752 and £20,000 is carried forward.

E. K. Cole, Ltd., reports a net profit of the group, after providing for depreciation and taxation, of £159,215 for the year ended 31st March last, as compared with £155,050 for 1950-51. Taxation absorbed £304,000. It is proposed to pay a final dividend of 15 per cent, making 25 per cent for the year (unchanged).

Telephone Properties, Ltd., are again to pay a dividend of 8 per cent. The net profit declined from £57,018 to £48,919.

Marryat & Scott Holdings, Ltd., are to pay a dividend of 22½ per cent (same as for the period 12th October, 1950, to 31st March, 1951).

Hoover, Ltd., is again to pay an interim dividend of 10 per cent on larger capital.

New Companies

Bracken Electric Co., Ltd.—Registered 24th June. Capital £3,500. To acquire the business of electrical engineers carried on by George Bracken and Vera E. Bracken, at 10a, St. Andrew's Street, Northampton. Directors : G. Bracken and Mrs. Vera E. Bracken. Regd. office : 10a, St. Andrew's Street, Northampton.

S. Loveday & Co., Ltd.—Registered 6th June. Capital £2,000. Radio, television, telephonic and telegraphic engineers, electrical engineers, etc. Directors : D. J. Loveday, S. J. Loveday and Ira H. Tucker. Regd. office : 17, Osborne Road, Pontypool, Mon.

McCulloch & Newitt, Ltd.—Registered 6th June. Capital £3,000. Electrical engineers and contractors, etc. Directors : H. J. McCulloch and J. S. Braime. Regd. office : 42, New Park Street, Leeds, 1.

Peter G. Rabjohn & Co., Ltd.—Registered 25th June. Capital £2,000. Manufacturers and repairers of and dealers in precision instruments, dynamos, motors, armatures, magnetos, batteries, etc. Directors : P. G. Rabjohn and Mary L. C. Rabjohn. Regd. office : 69, Manor Park Road, Harlesden, N.W.10.

Receiver Appointed

Wentworth Electrical Services, L d.—L. Parker, of 1, Old Burlington Street, W was appointed receiver and manager on 19th May, 1952, under powers contained in debenture dated 30th March, 1950.

Liquidations

John Richards & Co. (Longton), Ltd. (In voluntary liquidation).—A general meeting of members is to be held on 26th July at 9, Wellesley Street, Shelton, Stoke-on-Trent, to receive an account of the winding-up by the liquidator, Mr. E. Downward.

Carwin Electric Co., Ltd. (In voluntary liquidation).—Meetings of creditors and members on 1st August at 2, Chapel Street, Preston, Lancs, to receive an account of the winding-up by the liquidator, Mr. S. R. Aldrich.

Bankruptcies

H. B. Campbell, lately carrying on business under the style of "Electronic Trade Services" at 2170, Coventry Road, Sheldon, Birmingham, and at 227a, Golden Hillock Road, Small Heath, Birmingham, and at 2-4, Little Peter Street, Manchester, 15, electrical and television engineer.—First meeting 4th July at Somerset House, 37, Temple Street, Birmingham. Public examination 24th September at the Court House, Corporation Street, Birmingham.

R. J. F. J. Slinger, residing and carrying on business at 15, Lily Road, Litherland, lately residing and carrying on business at 55, Moor Lane, Great Crosby, both in Liverpool, electrical engineer.—First meeting 4th July at the Official Receiver's office, West Africa House, 25, Water Street, Liverpool. Public examination 29th July at the Court House, Fruit Exchange Buildings, Victoria Street, Liverpool.

E. W. Chapman, London House, King Street, Market Rasen, Lincs, electrical and radio engineer.—Trustee, Mr. R. Taylor, 150, High Street, Scunthorpe, Lincs, released 23rd May, 1952.

F. Pountney, electrical engineer, trading as the "Bordesley Electrical Co.", 164, High Street, Bordesley, Birmingham.—Proofs for dividend by 10th July to the trustee, Mr. R. K. Clark, Official Receiver, 37, Temple Street, Birmingham, 2.

J. R. Short, electrical contractor, formerly carrying on business at 11, Rutland Avenue, Bishop Auckland.—First and final dividend of 2d in the £ payable 10th July at the Official Receiver's office, 54, Westgate Road, Newcastle-upon-Tyne.

STOCKS and SHARES

AFTER weeks of almost unrelieved depression, some lightening of the atmosphere became perceptible in Stock Exchange markets towards the end of last week. Confidence cannot be said to have put out more than a few tender shoots, but at least there is more disposition than there has been of late to consider the possibility that prices have fallen quite far enough. Gilt-edged stocks showed signs of resistance to the idea that the necessity for a further hardening of the Bank Rate may arise sooner or later. This had its influence on industrials, which took encouragement also from tentative reports that the textile and other depressed sections of industry have passed the worst. In the electrical equipment market, dealings began in Siemens Brothers new £1 ordinary shares at a premium of 1s on the price of 28s at which they are offered to shareholders.

T. C. & M. Issues

On the heels of Siemens Brothers' share issue come details from Telegraph Construction and Maintenance of the capital plans mentioned by the chairman at the annual meeting in April. This is to be a double event, combining a free one-for-three share bonus, designed to bring nominal capital into better alignment with the amount actually employed, with an offer of new ordinary shares for cash, necessary for financing large export and rearmament orders. A meeting is called for 8th July to approve the necessary increase in authorized capital. Under the second part of the operation, shareholders will be given rights to subscribe for shares at 21s 6d in the proportion of two new for every three shares held before the bonus issue. As the apparently inevitable sequel to capital issue news, the existing £1 ordinary shares fell below 30s, but recovered later to 31s 3d, which leaves a substantial element of bonus in the offer.

Dividend Prospects

Shareholders in Telegraph Construction and Maintenance are advised by the company not to expect that the bonus issue will lead to any increase in the amount distributed in dividends. The directors anticipate a 7½ per cent dividend, on the larger capital, which would compare with the 10 per cent payments made for the last two years on the existing amount. Their forecast takes account of liability to the Excess Profits Levy, which is not calculated to be serious, and is made with reservations, inevitable in present circumstances, about unforeseen developments. At the same time, they point out that the suggested distribution would be covered well over twice by last year's net profits. On that basis, there is a prospective yield of practically 7 per cent at the offered price of the new shares, which will rank equally with the old except for the 5 per cent interim dividend to be paid next month.

Scottish Cables

A successful year's trading, ended last April, enables Scottish Cables to pay a slightly higher rate of dividend and to make larger allocations to reserves. After providing for increased taxation, the net profit of £125,000 came out about 17 per cent above the previous year's. The ordinary dividend is being raised from 30 to 32 per cent, which is still well within the rate of earnings. It is payable this time on capital increased to £292,000 as a result of last year's issue of 208,000 shares at 17s 3d. Although well up to expectations, the results have produced no quotable change in the price of the 4s shares, which stand at 18s 9d, to yield 6¾ per cent on the new rate of dividend. Subject to authority, the company proposes to issue a 100 per cent share bonus.

Dividend News

Reliance Clifton Cables 5s ordinary shares were marked up to 19s after the appearance of the results for the year ended last November. There is no change in the dividend, at a total of 30 per cent, but net group profits have risen from £94,000 to £104,000, which is nearly four times the amount distributed in preference and ordinary dividends. The yield on the shares is 7·9 per cent. Marryat & Scott's dividend of 22½ per cent, declared last week, is at the same rate as last year's payment, the first to be made after the marketing of the shares. These are unchanged at 5s. Scophony-Baird 1s shares have changed hands at about 10½d since news of the £35,000 trading profit, which compares with a previous loss of £56,000.

Week's Price Changes

E. K. Cole 5s shares were better unchanged at 14s 3d after the declaration of the 15 per cent final dividend. This again makes a total of 25 per cent for the year, but applies now to capital increased by 25 per cent as a result of last September's share bonus. It represents in effect a 5 per cent increase and is shown by the good preliminary profits statement to be covered some five times by available earnings. A rise of 2s in the price of G.E.C. ordinary is symptomatic of last week's recovery in what is known as the "blue-chip" category of home industrials. Metal Industries ordinary jumped 5s, to 41s, in response to news of the increase in the year's dividend from 10 to 15 per cent (on the big rise in profits) and of the proposed capital bonus. Crompton Parkinson at 8s 6d are unchanged on the news of the issue of 75,000 ordinary shares of 5s each to holders of the existing ordinary stock.

Electrical Investments

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price June 30 1952	Week's Rise or Fall	Est. Yield p.c.
Gilt-edged and Overseas Stocks			£ s d		
Brit. Elec. 1968/73	3	3	79¼	−½	3 15 7
Brit. Elec. 1974/77	3	3	78	−1	3 16 9
Brit. Elec. 1976/79	3½	3½	84½	−½	4 3 0
Brit. Elec. 1974/79	—	4¼	98½	+½	4 6 6
Calcutta Elec. ..	6†	6†	19/3	—	6 4 8†
East African Power	7	7	23/6xr	—	5 19 2
Nigerian Elec. ..	10	10	20/-	—	10 0 0
Palestine Elec. "A"	5†	5†	13/6	—	7 8 2†
Perak Hydro-Elec.	Nil	Nil	11/6	—	Nil
Equipment and Manufacturing					
Aberdare Cables (5/-)	20	20	10/9	—	9 6 0
Aerialite (1/-) ..	83½	88½	7/3	—	12 4 0
Aron Elec. Ord. ..	15	15	32/6	—	9 4 8
Assoc. Elec. Ord. ..	20	20	69/6	—	5 15 2
Automatic Tel. & El.	15	15	53/9	—	5 11 6
Babcock & Wilcox	18	18	60/9	—	5 18 6
Baldwin, H. J. (2/-)	25	25	4/9	—	10 10 6
Bakelite (10/-) ..	—	—	17/6	−9d	—
British Aluminium	10	12	38/3	+1/-	6 5 6
B.I. Callender's ..	7½	9	30/-	+9d	6 0 0
British Thermostat (5/-)	30	30	24/6	—	6 2 5
British Vac. Cleaner (5/-)	25	25	12/6	—	10 0 0
Brook Motors (10/-)	20	20	28/9	—	6 19 2
Brush Ord. (5/-) ..	10	10	4/6	—	11 2 2
A. F. Bulgin (1/-) ..	27½	30	2/6	−3d	12 0 0
Burco (5/-) ..	42½	38¾	18/9	—	10 6 8
Chloride El. Storage	15	15	53/9	—	5 11 6
Cole, E. K. (5/-) ..	25	25*	14/3	—	8 15 6
Cossor, A. C. (5/-)	Nil	Nil	10/3	+3d	Nil
Crabtree (10/-) ..	17½	17½	31/-	—	5 13 0
Crompton Parkinson Ord. (5/-) ..	11¼	11¼	8/6	—	6 12 3
De La Rue (5/-) ..	50	35*	12/-	+2/-	10 8 3*
Decca (1/-) ..	112½	112½	14/6	+6d	7 15 3
Dewhurst (2/-) ..	35	22½*	4/6	—	—
Dictograph Tel. (2/-)	20	20	4/9	—	8 8 6
E.M.I. (10/-) ..	8	12	13/9	+3d	8 14 6
Electrical Components (5/-) ..	20	20	10/-	—	10 0 0
Elec. Construction	15	15	42/6	−⅛	7 1 2
Enfield Cable Ord.	7½	7½	17/-	—	8 16 6
English Electric ..	15	15	51/6	—	5 16 6
Ericsson Tel. (5/-)	22†	22†*	33/9	−9d	3 5 1†
Ever Ready (5/-) ..	35	35	21/-	−1/-	8 6 8
Falk Stadelmann	15	15	35/9	—	8 7 10
G.E.C. Ord. ..	17½	22½	76/6	+2/-	5 17 9
General Cables (5/-)	30	30	12/6	—	12 0 0
Greenwood & Batley	15	15	40/-	—	7 10 0
Hackbridge Cable (5/-)	20	20	9/9	—	10 5 2
Hackbridge Hewittic (5/-)	15	18	14/-	—	6 8 7
Hall Tel. Acc. (10/-)	10	10	10/-	—	10 0 0
Heatrae (2/-) ..	12½	12½	4/-	—	6 5 0
Henleys (5/-) ..	20	20	14/9	—	6 15 6
Holophane (5/-) ..	15	15	8/9	+6d	—
Hoover (5/-) ..	37½	35*	23/-	+6d	7 12 2

Company	Dividend Previous	Dividend Last	Middle Price June 30 1952	Week's Rise or Fall	Est. Yield p.c.
Equipment and Manufacturing (continued)			£ s d		
Intl. Combustion (5/-)	20	25	21/-	+6d	5 19 3
Johnson & Phillips	15	15	48/3	—	6 4 2
Lancashire Dynamo	22½	12½*	38/6	—	6 9 1
Laurence, Scott (5/-)	12½	15	11/9	−6d	6 7 8
London Elec. Wire	10	12½	42/-	—	5 19 0
J. Lucas	17½	7½*	29/6	—	5 1 9
Marryat & S. (2/-)	22½	22½	5/-	—	9 0 0
Mather & Platt ..	12½	12½	35/-	−⅛	7 2 10
Metal Industries..	10	15	41/-	+5/-	7 6 4
Mid. Elec. Mfg. ..	15	15	55/-	—	5 9 0
Murex	10	12½	45/9	+9d	5 9 2
Newman Ind. (2/-)	6	10	2/6	—	8 0 0
Oldham & Son (1/-)	30	30	4/3	—	7 1 3
Parnall (Yate) (5/-)	6	6	3/-	—	10 0 0
Parsons, C. A. ..	15	10*	47/6	—	4 4 3
Plessey (5/-) ..	20	22½	17/-	—	6 12 4
Pye Deferred (5/-)	35	18*	15/-	−6d	6 0 0
Revo (10/-) ..	27½	27½	33/9	—	8 3 0
Reyrolle	15	10*	41/-	+1/-	4 17 6
Scot. Cable (4/-) ..	30	32	18/9	—	6 15 0
Siemens Ord. ..	10	10	28/9	—	6 19 3
Strand Elec. (5/-)..	17½	17½	8/3	—	10 12 2
Sturtevant (5/-) ..	16⅔†	17½*†	21/3	−9d	—
Switchgear & Cowans (5/-)	22½	22½	13/9	—	8 3 8
Taylor T. (5/-) ..	20	20	20/-	—	5 0 0
T.C.C. (10/-) ..	20	20*	36/3	—	—
T.C. & M. ..	10	10	31/3	+⅛	6 8 0
Telephone Mfg. (5/-)	10	10	7/9	—	6 9 0
Thorn Elec. (5/-) ..	20	10*	7/9	—	6 9 0
Tube Investments	25	25	50/-	—	—
Vactric (5/-) ..	Nil	Nil	4/6	—	Nil
Veritys (5/-) ..	Nil	7½	3/9	—	10 0 0
Walsall Conduits (4/-)	70	70	46/3	—	6 1 0
Ward & Goldstone (5/-)	44	45*	38/-	+1/9	5 18 5
Watford (2/-) ..	25	25	6/-	—	8 6 8
Westinghouse Brake	14	14	44/-	—	6 7 3
West, Allen (5/-) ..	12½	15	9/3	—	8 2 2
Trusts, Transport and Communications					
Anglo-Am. Tel.: A Ord.	—	4½	76	−1½	5 18 6
Ord.	—	56/3	55	—	5 2 3
Anglo-Portuguese	8	8	20/3	—	7 18 0
Brit. Elec. Traction: Def. Ord. ..	22½	25	335	−5	7 9 2
Cable & Wireless: Ord.	6	8	110½	—	7 4 10
4% Loan ..	4	4	96	—	4 3 4
Calcutta Trams ..	6†	6†	21/-	—	5 14 3†
Cape Elec. Trams	4	5	12/6	—	8 0 0
Marconi Marine ..	7½	10	27/6	—	7 5 6
Oriental Tel. Ord.	16	16	53/3	+9d	—
Telephone Props.	8	8	28/9	—	5 11 4
Tele. Rentals (5/-)	10	10	8/3	—	6 1 3

* After capital bonus.
†Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 13th August from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1945

2579. Mullard Radio Valve Co., Ltd., Richards, C. L., and Glaisher, E. J.—Frequency determining circuit arrangements. 7th May, 1947. (677221.)

1946

6370. British Thomson-Houston Co., Ltd.—Electron discharge devices of the velocity-modulation type. 1st March, 1946. (677223.)

1947

15648 & 16204. Standard Telephones & Cables, Ltd., and Roberton, J. S. P.—Electro-acoustic transducers. 11th June, 1948. (Addition to 624566.) (677225/6.)

1948

10899. British Thomson-Houston Co., Ltd., Jewitt, D. E., and Couling, S. A.—Power transmission couplings and systems. 28th April, 1949. (677229.)

12128. Hewittic Soc. Anon.—Remote control system, signal transmission or telecommunication systems. 3rd May, 1948. (677230.)

20243. Hauerslev, W.—Mould or die for the casting or moulding of spools for electrical tuning coils, coupling coils, and choking coils for radio receivers. 29th July 1948. (677231.)

28856. Standard Telephones & Cables, Ltd., Roberton, J. S. P., and Chapman, R.—Electro-acoustic transducers. 4th November, 1949. (Addition to 677225.) (677235.)

33605. Quiz Electrics, Ltd., and Jupe, G.—Coin-freed mechanism. 21st November, 1949. (677238.)

1949

8005. Electric & Musical Industries, Ltd.—Thermionic valve amplifiers in television apparatus. 16th March, 1950. (677126.)

10022. Murex Welding Processes, Ltd., Rollason, E.C., and Roberts, D. F. T.—Metallic arc welding electrodes for depositing austenitic weld metal. 13th April, 1950. (677128.)

11330. Radio Corporation of America.—Suspension for producing an insulating coating by electrophoresis. 28th April, 1949. (677332.)

14714. General Electric Co., Ltd., and Scott, P.—Direct current electric supply systems. 1st June, 1950. (677247.)

21440. National Research Development Corporation.—Electrical measuring systems and apparatus therefor. 17th November, 1950. (677255.)

21761. General Electric Co., Ltd., Osborne, W. C., and Rycroft, J. L.—Electric air heating units. 16th August, 1950. (677139.)

23134. Electric & Musical Industries, Ltd.—Tuning arrangements for radio and like receivers. 7th September, 1950. (677143.)

21082. Telemecanique Electrique.—Electrodynamic braking systems for electric motors. 19th September, 1949. (677441.)

24751. Philips Electrical, Ltd.—Control systems for X-ray tubes. 27th September, 1949. (677145.)

25579. British Thomson-Houston Co., Ltd.—Speed control systems for electric motors. 3rd October, 1949. (677144.)

26637. Standard Telephones & Cables, Ltd.—Joints for coaxial conductor electric communication cables. 13th October, 1950. (Cognate application 26638, 17th October, 1949.) (677348.)

26975. Dumont Laboratories, Inc., A. B.—Thermionic amplifiers of the band pass type. 20th October, 1949. (677260.)

27672. Sciaky, D.—Electric welding machines and electrode structures therefor. 28th October, 1949. (677449.)

28005. Communications Patents, Ltd., and Easton, K. J.—Wired broadcasting systems. 1st February, 1951. (677450.)

28241. Stordy Engineering, Ltd., and Stordy, J. J.—Electric furnaces for the heat treatment of metal or other articles in batches. 13th November, 1950. (677266.)

28407. Communications Patents, Ltd., and Gabriel, R. P.—Wired broadcasting systems. 7th February, 1951. (677452.)

29064. Nettle Accessories, Ltd., and Garner, J. A.—Snap-action electric switches. 14th November, 1950. (677351.)

29361. Evershed & Vignoles, Ltd., and Hayden, G. T.—Electronic repeater systems. 16th November, 1950. (677272.)

29814. Davis & Son (Derby), Ltd., J., Lucas, Ltd., J., and Davis, W. H.—Pneumatically-driven turbo-electric lamps. 22nd February, 1951. (677273.)

30004. Compagnie Electro-Mecanique.—Stator winding machines. 23rd November, 1949. (677276.)

32234. General Electric Co., Ltd., and Matthews, A.—Apparatus for measuring mechanical quantities. 8th December, 1950. (Cognate application 19740, 8th August, 1950.) (677355.)

33076. Pillot de Coligny, G. de.—Directional radio transmission systems. 28th December, 1949. (677460.)

33484. Lucas, Ltd., J.—Thermally-operable electric switches. 29th November, 1950. (677161.)

1950

30. English Electric Co., Ltd.—Electric motor control systems. 22nd December, 1950. (677358.)

1457. Stableford, J. L.—Screen hooding means for television receivers. 19th January, 1951. (677165.)

1921. Hassett & Harper, Ltd.—Screening covers for electronic valves. 26th February, 1951. (677285.)

2090 & 2223. General Electric Co., Ltd., and Bryer, R. F.—Electrical contactors. 2nd January, 1951. (677465/6.)

2215. Muirhead & Co., Ltd.—Dynamo-electric machines. 17th January, 1951. (677287.)

2842. English Electric Co., Ltd.—Separation of solid particles from flowing steam. 19th January, 1951. (677289.)

4015. British Thomson-Houston Co., Ltd., and Choudhury, S. U. A.—Systems using dynamo-electric machines for servo position control. 7th November, 1950. (677362.)

4016. Hodges, S.—Electrically heated clothes dryers and airers. 7th February, 1951. (677290.)

4432. Soc. de la Pile Leclanche.—Construction of flat dry cells. 21st February, 1950. (677291.)

8717. Globe-Union, Inc.—Inductance unit. 6th April, 1950. (677295.)

8765. Philips Electrical Industries, Ltd.—Electric incandescent lamps. 6th April, 1950. (677182.)

9714. Garcia, R. D.—Installation for using sea movements to generate electricity. 20th April, 1950. (677186.)

10026. Hoover, Ltd.—Floor polishers. 24th April, 1950. (677475.)

10150. Nippert, P. W.—Construction of commutators. 25th April, 1950. (677366.)

12323. British Thomson-Houston Co., Ltd.—Synchronizing systems for oscillators. 17th May, 1950. (677478.)

12442. Electrolux, Ltd.—Floor polishing or treating machines. 18th May, 1950. (677190.)

12481. British Thomson-Houston Co., Ltd.—Plasticized vinyl halide resins and electrical conductors insulated therewith. 18th May, 1950. (677369.)

14114. British Thomson-Houston Co., Ltd.—Synchronizing systems for oscillators. 6th June, 1950. (677481.)

14935. Rauland Corporation.—Electron discharge tubes for storing electrical signals. 15th June, 1950. (677300.)

16687. Soc. Rateau, and Auxionnaz, R.—Semi-open circuit gas-turbine engines. 4th July, 1950. (677485.)

19749. Siemens & Halske Akt.-Ges.—Electric condensers, and in particular roll-type condensers. 8th August, 1950. (677489.)

20136. British Thomson-Houston Co., Ltd.—Means for preventing or indicating wheel slippage in electrically-driven vehicles. 14th August, 1950. (677382.)

20242. Radio-Industrie.—Television scanning devices. 15th August, 1950. (677201.)

21038. Standard Telephones & Cables, Ltd. (Federal Telecommunication Laboratories, Inc.).—Control of wavelength in waveguide and coaxial lines. 25th August, 1950. (677385.)

21318. Garrett Corporation.—Methods for the calibration processing of an electrical element. 29th August, 1950. (677206.)

22311. Philips Electrical Industries, Ltd.—Protective circuit arrangements for X-ray tubes. 11th September, 1950. (677389.)

22427. British Thomson-Houston Co., Ltd.—Synchronizing systems for oscillators. 12th September, 1950. (677492.)

24723. British Thomson-Houston Co., Ltd.—Freezing trays. 10th October, 1950. (677307.)

26097. Rauland Corporation.—Storage electrodes for use in electron discharge tubes for storing electrical signals. 26th October, 1950. (677310.)

26288. Sunbeam Corporation.—Electric motor. 27th October, 1950. (677211.)

26500. Westinghouse Electric International Co.—Uniting of electrical conductor leads. 31st October, 1950. (677402.)

27294. Westinghouse Electric International Co.—Liquid break electric circuit interrupters. 8th November, 1950. (677405.)

27702. Mond Nickel Co., Ltd.—Welding electrodes. 13th November, 1950. (677106.)

27941. British Thomson-Houston Co., Ltd.—Single-phase series commutator motors. 15th November, 1950. (677407.)

28970. British Thomson-Houston Co., Ltd.—Methods of brazing titanium. 27th November, 1950. (677213.)

29531. Kuhnke, H.—Contact spring assemblies for relays and other switches. 1st December, 1950. (677316.)

1951

39. Electrolux, Ltd.—Absorption refrigerating apparatus. 1st January, 1951. (677498.)

904. Compagnie Electro-Mecanique.—Methods of manufacturing electric commutators. 12th January, 1951. (677499.)

1235. Dow Chemical Co.—Electric primary cell. 16th January, 1951. (677416.)

1751. Darling, R. E.—Composite mechanical and electrical plug and socket connectors. 23rd January, 1951. (677317.)

2208. Leeds and Northrup Co.—Self-balancing systems for voltage measurement. 29th January, 1951. (677318.)

3985. Ohio Carbon Co.—Resistors. 19th February, 1951. (677319.)

4972. Welwyn Electrical Laboratories, Ltd.—Electrical resistors and connections therefor. 1st March, 1951. (677502.)

5266. Philips Electrical Industries, Ltd.—Pulse amplifiers. 5th March, 1951. (677506.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks, objections against which may be entered up to the dates stated:—

18th July

QUICKWAY. No. B698,461. Class 7. Coil winding and coil forming machines.—Midland Dynamo Co., Ltd., 64, Belgrave Gate, Leicester.

KENMIX. No. 705,697. Class 7. Mixing machines for treating foodstuffs.—Kenwood Electrics, Ltd., Kenwood Works, Ripley Street, Old Woking, Surrey.

MICRODUAL. No. 705,004. Class 9. Electrical apparatus and component parts of wireless receivers, all included in Class 9.—B. Zucker, 138a, Cromwell Road, London, S.W.7.

COURIER. No. 705,528. COUNSELLOR. No. 705,529. Both Class 9. Television apparatus and parts thereof included in Class 9.—Avimo Ltd., Herbert Street, Rowbarton, Taunton, Somerset, and 27, Regent Street, London, S.W.1.

No. B705,817 (design). Bells and parts and fittings, all included in Class 9.—Gillett & Johnston, Ltd., 7, Union Road, Croydon, Surrey.

SURLUSH (design). No. 705,888. Class 9. Electrical instruments and apparatus and parts included in Class 9.—Falk, Stadelmann & Co., Ltd., Veritas House, 91, Farringdon Road, London, E.C.1.

POLYBOND. No. 706,413. POLYFLUX. No. 706,452. Both Class 9. Aerials for wireless, telegraphy and television, electric flexibles, insulated wires for electrical purposes, cable for electric transmission systems and electricity conductors.—Concordia Electric Wire Co., Ltd., Trent Mills, Derwent Street, Long Eaton, Nr. Nottingham.

QUALBAT. No. 706,989. Class 9. Electrical apparatus and instruments included in Class 9.—E. Marshall, trading as Marshall Batteries, 44, South End, Croydon, Surrey.

HISTAB. No. 707,102. Class 9. Electrical resistances.—Radio Resistor Co., Ltd., 50, Abbey Gardens, London, N.W.8.

MAXHEAT. No. 700,919. Class 11. Tubular electric heaters, oval in shape.—Wardle Engineering Co., Ltd., Elsinore Road, Old Trafford, Manchester, 16.

25th July

ATLAS. No. 697,893, Class 9. Electric safety fuses (cut-outs), thermostats and insulated cables; motor analysers, being electrical apparatus for testing and indicating the performance of i.c. engines, etc.—Atlas Supply Co., Newark, N.J. Address for service, c/o D. Young & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

CESIWID. No. 699,390, Class 9. Rod-shaped electric heating resistors included in Class 9 and pyrometer protection tubes. No. 691,615, Class 11. Refractory pressed elements, thermally or electrically conductive, in block, plate, tubular or bar form for industrial furnaces; and electrical heating elements included in Class 11.—Elektrogeratebau Cesiwid G.m.b.H., Erlangen. Address for service, c/o G. F. Redfern & Co., Redfern House, Dominion Street, London, E.C.2.

MYRIA. No. B706,469, Class 9. Ohmmeters.—Electronic Instruments, Ltd., 17, Paradise Road, Richmond, Surrey.

JIFEX. No. 706,878, Class 9. Electric vacuum cleaners, parts and fittings, all included in Class 9.—Water Softener & Vacuum Cleaner Service, Ltd., 248, Romford Road, Forest Gate, London, E.7.

E.I.B.A. Annual Meeting

THE annual general meeting of the Electrical Industries Benevolent Association will be held at 11 a.m. on Thursday, 17th July, at the Institution of Electrical Engineers, Savoy Place, London, W.C.2.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — MELBOURNE. — 12th August. Director of Posts and Telegraphs, Melbourne. Diesel alternator sets ranging from 6 to 60 kVA. (C.R.E. 22239/52. Ten/4241.)*

Bedlington (Northumberland). — 11th July. U.D.C. Supply of electric fittings and cable for the Council housing schemes. Surveyor, Council Offices, Bedlington.

Castleford (Yorks).—21st July. U.D.C. Refrigerated display units. (See this issue.)

Durham. — 11th July. County Education Committee. Electrical installation in rural domestic economy centre at Houghall, Durham. County architect, Court Lane, Durham.

India.—DELHI.—14th July. Director General of Supplies and Disposals. Supply and installation of four express passenger lifts. (C.R.E. 22268/52. Ten/4228.)*

Manchester.—19th July. City Council. Electrical installation in portion of Oakwood Hall, Romiley, including lighting of the drive. City architect, Town Hall.

Romford.—21st July. Corporation. Electrical installations in 440 houses and 11 bungalows. (See this issue.)

Sale.—9th July. Town Council. Electrical installations in 32 houses on the Oaklea Farm estate. Borough surveyor, Town Hall.

South Africa.—JOHANNESBURG.—21st July. Mineral Baths Board of Trustees. Supply and erection of 180 kVA hydro-electric generating plant for Badplaats. (C.R.E. 22436/52. Ten/4243.)*

21st July. City Stores and Buying Branch. Meters, test blocks and current transformers. (C.R.E. 22666/52. Ten/4256.)*

PRETORIA.—30th July. Department of Posts and Telegraphs. Supply of coaxial cable and fittings. (C.R.E. 22665/52. Ten/4268.)* 31st July. Union Tender and Supplies Board. Radio telephone equipment. (C.R.E. 9743/52. Ten/4264.)*

Uruguay.—MONTEVIDEO.—28th July. Ministerio de Salud Publica. Miscellaneous electrical equipment including several thousand insulators, over 100,000 metres of wire, fuse boxes, lead telephone cable, electric heaters, plugs, radiators, lamps (over 50,000), sunlamps, switches, electric irons, etc. (C.R.E. 21674/52. Ten/4245.)*

26th August. Usinas Electricas y Telefonos del Estado. Supply of copper conductors. (C.R.E. 22784/52. Ten/4257.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

ORDERS PLACED

Carlisle.—City Council. Electrical installations in 108 houses.—North Western Electricity Board.

Durham.—County Council. Electrical installation in new college of further education at Billingham-on-Tees (£19,112). — Troughton & Young, Ltd.

Longbenton (Northumberland).—U.D.C. Electrical installations in 32 houses at Forest Hall and 28 houses at Wideopen.—J. B. Wilson. Installations in 128 houses on the Burradon housing estate and 70 houses on the Fordley estate.—J. G. Patton.

Malton (Yorks).—U.D.C. Electrical installations: Houses (44), Cherry Tree Avenue and Almond Tree Avenue, Malton (£784).—J. Tubbs. Houses (32) and flats (20), Hawthorn Avenue (£855).—F. Kirk. Houses (56), Birch Tree Avenue and Lime Tree Avenue (£980).— Yates, Nunwick & Wood.

North Shields.—Tyne Improvement Commission. Substation and electrical equipment for new coal staiths to be erected at Whitehill Point, North Shields.—English Electric Co., Ltd.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abram (Lancs).—Pithead baths at Abram Colliery, Bolton House Road; N.C.B. Architect's Department, Peter Street, Manchester.

Acton.—Rebuilding factory, North Acton Road and Minerva Road; Wesley Estates, Ltd., 9, Wesley Avenue, N.W.10.

Aspull (Lancs).—Houses (20); U.D.C. surveyor.

Barnsley.—Factory extensions, Hoyle Mill Road, Stairfoot; Beatson Clark & Co., Ltd., medical glass manufacturers, Masboro and Barnsley.

Bellshill (Lanarkshire). — Additions to works, Mossend Ironworks; Stewarts & Lloyds, Ltd., Oswald Street, Glasgow.

Belper (Derbys).—Houses for R.D.C.: Crich Lane No. 3 site (16); J. Milward & Sons, Market Place. Windmill Rise site (10); J. W. Haynes & Son, Strutt Street.

Billingham-on-Tees.—Laundry at Nylon Works for Imperial Chemical Industries, Ltd.

Birkenhead.—New workshops; J. Gordon Alison & Co., Ltd., Dock Engine Works.

Birmingham.—Houses at Hawesley Farm estate, West Heath (70), The Radleys, Sheldon (16), and Moseley Street (6); city engineer.

Bracknell.—Development of Farley Copse Farm site for industrial purposes; chief architect to the Development Corporation, Farley Hall, Binley, Bracknell.

Bradford.—First section of scheme for rebuilding Rawson Place Market (£39,500); W. H. Leathem, town clerk.

Burnley.—Five blocks of flats at Cromer Avenue; H. & R. Glegg, Ltd., Bull Street.

Canterbury.—Administration block at bus station; East Kent Road Car Co., Ltd., Harbledown.

Cardiff.—Eight shops and flats, Newport Road, Rumney; J. E. Evans & Co., Ltd., Collingdon Road.

Extensions, Whitchurch Hospital; D. G. Walton, architect, Maesycoed Road.

Coventry. — Comprehensive high school, Broad Lane (£300,000); city architect.

Cuckfield (Sussex).—Dwellings (44), Hurstpierpoint; R.D.C. surveyor, Boltro Road, Haywards Heath.

Cumberland.—Rural type police stations at Thursby, Hallbankgate, Crosby-on-Eden, Allonby, Cummersdale, Langwathby, Parton, Mirehouse, Whitehaven and Workington, clinic at Penrith and college of further education at Whitehaven; county architect, Portland Square, Carlisle.

Derbyshire.—Junior schools at Altreton, Frecheville, Hackenthorpe and Newbold, secondary schools at Bolsover and Frecheville, and infants' school at Eckington; F. H. Crossley, county architect, St. Mary's Gate, Derby.

Dewsbury. — Houses, Church Lane/School Lane site (120), Church Lane/Staincliffe Road (30) and Green Lane (24); borough architect.

Felling (Co. Durham). — Houses (320) south of Sunderland Road for U.D.C.; R. Morton, housing officer.

Gillingham (Kent).—Houses (39), Romany estate; F. Hill, town clerk, Municipal Buildings.

Hartlepool.—New lightening berth at Hartlepool Docks for the Docks and Inland Waterways Executive (£330,000); T. S. Roberts, dock manager, West Hartlepool.

Heanor.—Houses (52), Marlpool Farm estate, for U.D.C.; Vic Hallam, Ltd., Valley Works, Langley Mill, Notts.

Hounslow.—Staff houses (101), Great West Road site; British Airways Housing Society.

Hull.—Cinema, for Hull Cinemas, Ltd.; Gelder & Kitchen, architects, Alfred Gelder Street.

Jarrow-on-Tyne.—Houses (108); borough engineer.

Lanarkshire.—Houses (448), on seven sites; S. McColl, county architect, Beckford Street, Hamilton.

Lincoln.—Extensions at County Hospital including outpatients' department; Adams, Holden & Pearson, architects, 2, Gordon Square, London, W.C.1.

Liverpool. — Reconstruction of furniture factory at 59/61 St. Anne Street for Jaem Furnishings, Ltd.; S. E. Tucker, architect, 20, Dale Street, Liverpool.

Additions at Evans Road, Speke, for Manesty Machines, Ltd.; Morter & Dobie, architects, 11, Rumford Street, Liverpool.

London.—Deptford.—Dwellings (314), Grove Street; Bridgewater & Shepheard, architects, 42, Bruton Place, W.1.

Shoreditch.—Dwellings (40), Avebury Street; borough engineer.

Melford (Suffolk).—Houses (32), Bures St. Mary and Great Waldingfield; H. C. Hughes & P. Bicknell, architects to R.D.C., 1, Tunwell's Court, Trumpington Street, Cambridge.

Morpeth.—Houses (66), Spelvit Lane; F. K. Perkins, borough engineer.

Newcastle-on-Tyne.—New church at Cowgate (£12,000); Stanley Miller, Ltd., builders, North Street.

Northampton.—Houses (22), Westone House estate; T. Wilson & Son, Ltd., 67, Sheep Street.

North Riding.—R.C. primary school at Redcar; county school architect, County Hall, Northallerton.

Penrith.—Houses (24) for the U.D.C.; F. Birkbeck, surveyor.

Penzance. — Filtration plant and storage buildings, Boscathnoe reservoirs; borough engineer.

Rottingdean.—Primary school for C.E. managers; Ringmer Building Works, Ltd., Ringmer, Lewes.

Ruthin. — Houses (82), Haulfryn estate; borough surveyor, Town Hall.

Sittingbourne.—Works extensions; Bowater's Lloyd Pulp & Paper Mills, Ltd., Kemsley Mills.

South Shields.—Houses (320) for the T.C. Builders: J. Prentice, Leeds Street, Fulwell (174); J. M. Black, Ltd., Glen Street, Hebburn (112); and Johnstone & Hall, Boyd Road, Wallsend (34).

Stevenage.—Houses (70), Ryecroft estate, for U.D.C.; N. M. Priestland, clerk, Council Offices.

Stockport.—Houses, Hawfield Gardens (51), Turncroft Lane (25) and Harold Street (17); borough engineer.

Stockton-on-Tees.—Conversions at Y.M.C.A. Theatre for cinema; T. A. Crawford, architect, 80, Borough Road.

Tynemouth.—Houses and flats (180), Chirton Grange; borough engineer, 16, Northumberland Square, North Shields.

Wellingborough.—Houses for T.C.: Drabble Construction, Ltd., Wellingborough, Northants (30 dwellings) and Drury & Co., Ltd., Windmill Avenue, Kettering (66).